

Sand Problem Unit

Return

# WATERSHED WORK PLAN

# STONY BROOK WATERSHED

MERCER AND HUNTERDON COUNTIES  
NEW JERSEY



*Prepared under the authority of the  
Watershed Protection and Flood Prevention Act  
(Public Law 566, 83rd Congress, 68 Stat. 666)*

FEBRUARY 1956

Structure Size - OK  
Fed. Cost.

\$187,050 Fed. Contribution to Const. Cost.  
269,610 Total Fed. Cost.

WATERSHED WORK PLAN

STONY BROOK WATERSHED  
Mercer and Hunterdon Counties  
New Jersey

Prepared by: Stony Brook-Millstone Watersheds Association, Inc.  
Freehold Soil Conservation District  
Mid-Jersey Soil Conservation District

With assistance by:

United States Department of Agriculture, Soil Conservation Service  
United States Department of Agriculture, Forest Service

January 1956

STONY BROOK  
WATERSHED WORK PLAN

AGREEMENT

between the

Freehold Soil Conservation District

Mid-Jersey Soil Conservation District

Stony Brook-Millstone Watersheds Association, Inc.

STATE OF New Jersey

and the

SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

Whereas, application has heretofore been made to the Secretary of Agriculture by

Freehold Soil Conservation District,

Mid-Jersey Soil Conservation District and

Stony Brook-Millstone Watersheds Association, Inc.

State of New Jersey, hereinafter referred to as the local organization, for assistance in preparing a plan for works of improvement for the Stony Brook Watershed, State of New Jersey, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act has been assigned by the Secretary of Agriculture to the Soil Conservation Service, hereinafter referred to as the Service; and

Whereas, there has been developed through the cooperative efforts of the local organization and the Service a mutually satisfactory plan for works of improvement for said watershed, designated as the watershed work plan for Stony Brook Watershed, State of New Jersey, which watershed work plan is annexed to and made a part of this agreement; and

Whereas, the watershed work plan describes the watershed and its problems, and sets forth a plan for works of improvement including a schedule of operations, the kinds and quantities of measures to be installed, the estimated cost, cost-sharing arrangements, maintenance and other responsibilities of those participating in the project, and economic justification for installing, operating and maintaining the works of improvement; and

Whereas, the Watershed Protection and Flood Prevention Act provides (a) that the local organization and the Secretary of Agriculture shall agree on the watershed work plan prior to participation by the Secretary of Agriculture in the installation of the works of improvement as set forth in said plan, and (b) that, at least forty-five days (while Congress is in session) before such installation involving Federal assistance is commenced, the watershed work plan and the justification therefor shall be transmitted by the Secretary of Agriculture to the Congress through the President;

Now, therefore, in view of the foregoing considerations, the local organization and the Secretary of Agriculture, through the Service, hereby agree on the watershed work plan, and further agree that the works of improvement as set forth in said plan will be installed, operated, and maintained substantially in accordance with the terms, conditions, and stipulations provided for therein.

It is further understood that this agreement does not constitute a financial document to serve as a basis for the obligation of Federal funds, and that financial and other assistance to be furnished by the Service in carrying out the watershed work plan is contingent on the appropriation of funds for this purpose and on the execution of supplemental agreements setting forth the cost-sharing arrangements and other conditions that are applicable to specific works of improvement.

It is further agreed that the watershed work plan may be amended or revised, and that this agreement may be modified or terminated, only by mutual agreement of the parties hereto,

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

Freehold Soil Conservation District

By /s/ R. C. Clayton

Title Chairman

Date January 25, 1956

The signing of this agreement was authorized by a resolution of the governing body of the Freehold Soil Conservation District,

adopted at a meeting held on December 14 1955.

/s/ M. A. Clark  
Secretary

Date January 26, 1956

Mid-Jersey Soil Conservation District

By /s/ Fred H. Totten

Title Chairman

Date 1/25, 1956

The signing of this agreement was authorized by a resolution of the governing body of the Mid-Jersey Soil Conservation District,

adopted at a meeting held on January 30, 1956.

/s/ Eric H. Peterson Jr.  
Secretary

Date January 30, 1956

Stony Brook-Hillstone  
Watersheds Association, Inc.

By /s/ Paul M. VanWegen

Title President

Date Jan. 24,, 1956

The signing of this agreement was authorized by a resolution of the trustees of the Stony Brook-Hillstone Watersheds Association, Inc.,

adopted at a meeting held on January 27, 1956

/s/ Malcolm P. Crooks  
Secretary

Date January 30, 1956

Soil Conservation Service  
United States Department of Agriculture

By \_\_\_\_\_  
Administrator

Date \_\_\_\_\_, 1956

## Stony Brook Watershed Work Plan General Summary

The watershed work plan for Stony Brook, New Jersey, was prepared by the Freshhold and Mid-Jersey Soil Conservation Districts and the Stony Brook-Millstone Watersheds Association, Inc. as the sponsoring local organizations with technical assistance provided by the United States Department of Agriculture.

The watershed work plan covers an area of approximately 47.8 square miles or 30,604 acres in Mercer and Hunterdon Counties, New Jersey. Approximately 58% of the watershed is cropland; 9% is grassland; 26% is woodland; and 7% miscellaneous such as towns, roads, etc.

No Federal lands or irrigation developments are involved.

The work plan proposes a ten-year project for the protection and development of the watershed at a total estimated cost of \$517,149. The non-Federal share will be \$307,772 or 59.5% and the Federal share \$209,377 or 40.5%.

### Purpose of This Watershed Project

The purpose of this plan is to complete the planning and application of farmer-district conservation farm plans in the watershed to improve and protect the economic base of the community; to install desilting basins to protect Carnegis Lake from losing its value through sedimentation; to contribute to more usable water supplies through increased groundwater recharge, more uniform stream flow and the abatement of siltation.

### Land Treatment Measures

The cost for land treatment measures needed for watershed protection is estimated at \$257,017, exclusive of any ACP payments. The farmers' out-of-pocket share of this cost is \$221,244. The Federal share, consisting entirely of additional technical assistance needed to complete the program in ten years is \$35,773.

### Structural Measures

The structural measures included in the plan consist of nine desilting basins having an aggregate capacity of 480 acre feet. The total cost of these measures, including the capitalized value of operation and maintenance cost is \$260,132. Of this amount, the local sponsors will bear \$86,528 and the Federal Government will bear \$173,604.

### Damages and Benefits

The ratio of the average annual benefit (\$11,650) to the average annual cost of structural measures (\$7,082) is 1.65 to 1.00.

The total benefits of land treatment measures were not evaluated in monetary terms since experience has shown that these soil and water conservation measures produce benefits in excess of their costs.

#### Relation of Benefits to Cost-Sharing

Direct, identifiable local benefits accruing to taxable property comprise 1.3% of the total benefits of the project. Local interests propose to pay 59.5% of the total project costs.

In addition to the evaluated monetary benefits, there will be very significant unevaluated benefits from the desilting basins. Among these are water for irrigation, livestock and fire protection; a clearer and more uniform stream flow which will enhance land values in the watershed; and increased food and improved shelter for wildlife and fish. Better water management will increase groundwater recharge and have a favorable effect on wells and springs, thereby providing a more uniform supply for agriculture and other uses.

The recreation and wildlife opportunities on two mill ponds and Carnegie Lake will be improved by a significant reduction in sediment deposition.

At present there are approximately 500,000 cubic yards of sediment in the Lake. It is the intention of Princeton University to remove this sediment in the near future and the capacity of the Lake will then be comparable to what it was when built. The removal of sediment is expected to coincide with the construction of the contemplated desilting basins.

Carnegie Lake, owned by Princeton University, is a valuable public asset open to the public for all uses including fishing, boating, skating, and swimming. All dredging costs in the past, have been, and in the future, will be paid for by popular subscription within the community. The protection of investments in property against silting damages have been considered as flood damages without regard to the use made of the property.

It is anticipated that sometime in the near future, surface waters in the Stony Brook Watershed will be required for domestic purposes due to expansion of population in the area and the natural limit of draft upon the present artesian supply.

#### Provisions for Financing Construction

The Board of Chosen Freeholders of Mercer County has accepted the contracting obligation of those structures to be constructed in Mercer County, and the Board of Chosen Freeholders of Hunterdon County has agreed to accept the contracting obligation of those structures to be constructed in Hunterdon County and will enter into agreements with the Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District.

Funds for the local share of the construction costs will be raised by the Stony Brook-Hillstone Watersheds Association, Incorporated.

Operation and Maintenance

Land treatment measures will be installed, operated, and maintained by the landowners or operators of the farms on which the measures are installed under agreements with the Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District.

The two desilting basins located in Hunterdon County will be operated and maintained by the Mid-Jersey Soil Conservation District and the seven desilting basins located in Mercer County will be operated and maintained by the Freehold Soil Conservation District. Both districts will enter into detailed agreements with the Stony Brook-Millstone Watershed Association prior to the issuance of invitations to bid under which the Association will give assurance for the operation and maintenance funds.

The Watershed Association has at present a \$10,000 annual budget made up of individual and organizational contributions which it can draw from for such purposes. It can also enlist special contributions as it has successfully done on several occasions in the past six years. In addition to this source of operation and maintenance funds, the Watershed Association can reasonably expect financial and service type of assistance from the local boroughs, townships, and counties.

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## WATERSHED WORK PLAN

Stony Brook Watershed  
Mercer and Hunterdon Counties  
New Jersey

January 1956

### INTRODUCTION

#### Authority

The Watershed Work Plan for the Stony Brook Watershed in Mercer and Hunterdon Counties, New Jersey, hereinafter referred to as the plan, will be carried out under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666.)

#### Purpose and Scope of Plan

The purpose of this plan is to state specifically the feasible practices and measures needed and how they will be carried out to achieve the maximum practicable reduction of erosion and sediment damages. Application of this plan will provide protection to and improvement of land and water resources. The development and execution of the plan is based upon the cooperation of Freehold Soil Conservation District and Mid-Jersey Soil Conservation District, the Stony Brook-Millstone Watersheds Association, Inc., Boards of Freeholders of Mercer and Hunterdon Counties, landowners, local, state and federal agencies and a coordinated utilization of their facilities.

The major water problem is one of sediment damage that affects the rural and urban residents of the watershed and adjacent areas. The downstream damage caused by sediment produced in the Stony Brook Watershed is of considerable extent, and affects people who have no control over the use and management of the land. This is a result of erosion, which occurs principally as sheet erosion in the watershed, with flood plain scour, gully erosion, streambank erosion and roadbank erosion all contributing to the problem. In some localities, lands have been severely damaged by this process to the detriment of the welfare of the community.

Upon completion and continued maintenance of the measures set forth in the plan, a major reduction in sediment damage will result and agricultural production will be increased.

The Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District provide through their Programs and Work Plans for the application of a complete program of soil and water conservation and improved plant management within this watershed. The objectives are to use each acre of agricultural land in accordance with its capabilities for sustained agricultural production and to treat each acre in accordance with its needs for protection and improvement. Such a program, when applied and maintained on all the land within the watershed, will have a major effect in the reduction of upland erosion rates which in turn will reduce sediment damages. Additional measures primarily for sediment reduction are needed to complete the soil, plant and water conservation program in the watershed and provide effective reductions in damage from sediment.

#### SUMMARY OF PLAN

This plan is a combination of land treatment practices and sediment control measures which contribute directly to soil, plant and water conservation and sediment damage reduction. The works of improvement as listed in Table 1 are planned to be installed during a 10-year period at an estimated total cost of \$501,854 of which \$292,477, or 58 percent, is to be borne by non-Federal interests and \$209,377, or 42 percent, by the Federal Government. The local people through the Stony Brook-Millstone Watersheds Association, Inc., will pay 30 percent of the construction cost for the structural measures to be installed under the plan.

The Freehold and Mid-Jersey Soil Conservation Districts, under authority of the State Soil Conservation Districts enabling legislation, agree to assume responsibility for periodic inspection and maintenance of the sediment control measures at an estimated annual cost of \$712. The landowners and operators will maintain the land treatment measures in accordance with provisions of the farmer-district cooperative agreements.

The estimated average annual monetary benefits resulting from the structural program are shown in Table 5.

With the works of improvement applied and operating at full effectiveness, the ratio of the estimated average annual benefit from the desilting basins, \$11,650, to the estimated average annual equivalent costs, \$7,082, is 1.65 to 1, based on long-term prices for costs and benefits.

In addition to the monetary benefits, there will be very significant unevaluated benefits from the desilting basins. Among these are increased food and improved shelter for wildlife and fish, water for use in irrigation, for livestock and fire protection, and a clearer and more uniform stream flow which will enhance land values in the watershed. Recreational opportunities will be greatly improved for boating, skating, picnicking, fishing and hunting. Bodies of water suitable for these purposes are needed here. Better water management will increase ground water recharge and therefore have a favorable effect on wells and springs in providing a more uniform supply for agriculture and other uses.

It is planned that 75 percent of the farms not yet planned will be planned in the 10-year period. Together with the farms already planned, 84 percent of all farms would then be cooperating. It is also planned that 60 percent of the remaining needed land treatment measures planned on all these farms will be applied in the 10-year period. This will result in the establishment of 45 percent of all the needed land treatment measures, and an estimated 80 percent of the most critical areas affecting the desilting basins.

The full attainment of the benefits evaluated in this report is dependent upon the cooperation and support of landowners and operators and local agencies in installing and maintaining the measures.

### DESCRIPTION OF THE WATERSHED

The Stony Brook Watershed is 47.8 square miles (30,604 acres) in area, lying principally in the northern part of Mercer County, New Jersey, with approximately 15 percent in southeastern Hunterdon County. Stony Brook rises on Sourland Mountain and flows southeasterly, joining the Millstone River in Carnegie Lake. It is made up of small tributaries - Peters Brook, Baldwin Brook, Honey Brook and other unnamed branches. The main stem, 17 miles long, has 55 miles of tributaries, a total length of approximately 72 miles.

Through two centuries, the watershed lands have been used for crops and pasture, the woodlands have been harvested for timber, and the stream has been used for power, water supply and recreation. Land and water use by many individuals of varying abilities and preferences over the years has led to the decline of resources, particularly soils subject to erosion. Yields from some soils are less than they should be, water resources have not been adequately utilized and, in addition, lack of proper land use and conservation methods has resulted in excessive sedimentation in two mill ponds and Carnegie Lake and impairment of recreational and wildlife values.

#### Topographic Features

The topography is gently rolling to hilly with a maximum headwater elevation of 550 feet and a minimum elevation of 50 feet at Carnegie Lake. Narrow trap rock and sandstone ridges alternate with broader shale valleys, generally extending northeast-southwest. These ridges are largely wooded. The remaining land is open and utilized for agriculture. Most of the area is gently sloping. More than three-fourths of the area falls in the two lower slope classes of 0 to 6 percent.<sup>1/</sup>

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<sup>1/</sup> The information on soils, slopes, erosion and present land use was obtained from a conservation survey, made of the entire watershed by technicians of the Soil Conservation Service. It was necessary to go over every field studying the slope, amount of erosion, and kind of soil for each area. This information was recorded on an aerial photograph and provides the basis for planning conservation in the watershed.

Data from Conservation Survey on Slope Classes

<u>Slope Class</u>	<u>Acres</u>	<u>Percent Total</u>
A- 0 - 2%	5,692	18.60
B- 2 - 6%	19,459	63.59
C- 6 - 12%	3,605	11.78
D- 12 - 18%	762	2.49
E- 18 - 30%	270	.88
F- 30% +	130	.42
Undesignated	686	2.24
<hr/> Total	<hr/> 30,604	<hr/> 100.00

Geology

Stony Brook rises in, and flows through an area underlain by thin-bedded red and gray, soft, silty or sandy shales underlain by massive, harder, red and gray mudstone with red and gray sandstone beneath. Into these formations trap rock was injected as a molten mass, in some places following bedding planes and in others crossing them. Bordering such intrusions the country rock has been baked hard and otherwise considerably altered.

In general, the bedrock has been tilted down about 30 degrees toward the northwest and broken into big blocks 10 to 15 miles wide. The result is that the various rock formations occur as bands, one to ten miles wide, trending northeast-southwest, the whole sequence being repeated twice in the watershed.

Soils

The soils of the Stony Brook Watershed are predominantly silt loams on the surface with heavier silt loam or silty clay loam subsoils. Over a considerable portion of the area the soil is less than two feet to bedrock. Even where the soil is deep to rock, about two-thirds of it is underlain at about two feet by a compact substratum which lets water through it very slowly. In general, therefore, the land may be considered to be moist and somewhat cold, crossed at varying intervals by narrow ridges of shallow and droughty soil. Runoff is high and sheet erosion intensive. Wetness and droughtiness are general problems.

Land Use

From data based on the conservation survey, about 44 percent of the total area is devoted to cropland including rotation hay, about 9 percent is in permanent grass, 26 percent in woodland and wildlife cover, and the remaining areas are 15 percent idle and 6 percent devoted to farmstead and other uses.

## Cover Conditions

As was pointed out above, about 44 percent of the total area is devoted to cropland including rotation hay. A large percentage of this area is used for row crops, principally corn and is open during the summer months, at which time slightly over half of the annual precipitation occurs. There is a rather large acreage which is devoted to cash grain crops without proper conservation rotations or winter cover crops, thus contributing to the erosion and sedimentation problem. Some of this land is farmed intensively for several years and then temporarily abandoned for a year or two without adequate cover. The present forest area provides fair watershed protection cover although past management practices have adversely affected both stand composition and density and reduced the effectiveness of the cover in controlling runoff and erosion. The remainder of the watershed has good cover except small areas where shallowness or wetness has adversely influenced plant growth. These areas are small and relatively insignificant.

## Climate

The climate of the area is relatively mild. Extremes of temperatures are considerably less than areas farther inland from the Atlantic Ocean. Although temperatures of 0°F. are occasional, the average January temperature is 30°F. Maximum summer temperatures of 100°F. occur, but 75°F. is the average July temperature.

The average growing season is 178 days, from April 23 to October 18, the average dates of the last killing frost in the spring and the first in the fall. The observed maximum variation from these frost dates is from April 1 to May 12 in spring and from September 22 to November 21 in fall, but the variation in the growing season is somewhat less than thus indicated since an early spring does not forecast a late fall or vice-versa. A 40-year record of the growing season shows a range from about 150 to 225 days.

Average annual precipitation is relatively uniform throughout the watershed. From long-term Weather Bureau records, the average annual fall of rain and the melted equivalent of snow is found to be 45 inches, of which slightly over one-half (approximately 23 inches) falls in the warm 6-month period, April through September. The total annual unmelted snowfall depth averages 28 inches, equivalent to about 3 inches depth of water. Ground covers of more than a foot of snow are rare. Snow is significant to the water supply of the watershed since it is an important source of ground water replenishment and because in rapid melting, associated with heavy rainfall, it is a flood hazard.

Records of rainfall show a very even average distribution throughout the year, no month having much more or less than another. These records also show that precipitation in a specific year may vary considerably from the average. Entire calendar months without measurable precipitation have been recorded in this vicinity, while storms with 8 inches of rain, more than twice the normal monthly catch, while not common, are by no means unknown.

Of real importance in this area is the thunderstorm type of precipitation. Thunderstorms occur in this area in all seasons of the year, but they are common only in the warmer months. Their extent may be from a few square miles to several hundred, but never do they cover areas comparable to the other storm types. They are characterized by high intensity precipitation lasting, at the most, a few hours. This type of storm causes considerable erosion loss and the highest runoff on the tributaries of Stony Brook.

Frost activity in the ground has considerable effect on erosion and sediment production. The large amount of freezing and thawing common to winter conditions in this area cause portions of the soil mass to readily detach by flowing water. This is particularly true where the ground is inadequately protected by a vegetative cover and accounts for much sediment production from both the exposed banks of streams and roads, and as sheet erosion from unprotected fields. Frost action also contributes markedly to sediment production on forest lands, particularly on recently cutover areas, on grazed forest land, and on the unstabilized logging roads. It should be noted that the frost damage potential is not determined by the severity of the winter, but rather by the number of freezing and thawing days which occur. Thus Stony Brook Watershed has a much more serious frost damage potential than areas farther north. Furthermore, the slow permeability of the soil intensifies this problem.

Wind measurements most applicable to the watershed are made at Trenton, New Jersey, a short distance south. This record, of more than fifty years, shows a relatively high average movement and high storm velocities for a non-coastal station. Although wind is not usually considered a serious erosion hazard in this area, velocities are great enough that it should not be overlooked, and it does affect soil moisture conditions.

#### Principal Water Uses and Sources

Nearly all of the water for farmstead and livestock use comes from shallow wells and small streams. Many of these go dry during a prolonged droughty period as was experienced the summer and fall seasons of 1952-1955. There is a serious shortage of water for livestock and domestic use in those drought periods. Grassland farming, now recommended for many of the farms, will increase the number of livestock and thus make the water shortage even more serious.

The Borough of Princeton draws its water supply entirely from five artesian wells located just southeast of the city, along the flats adjacent to Stony Brook. The water company is privately owned and operated with Princeton University holding a large amount of the stock. Although the water is considered pure as drawn, it is chlorinated as a safety measure. For 1954, the total consumption was 676 million gallons. The average daily per capita consumption is less than 100 gallons. Pennington secures its water supply from mountain springs and an artesian well. In 1954 the annual consumption was 40 million gallons. Average consumption per person per day is about 75 gallons.

Sometime it is likely that surface waters in the Stony Brook Watershed may need to be used for domestic purposes due to expansion of population in the area and the natural limit of draft upon the artesian supply.

### Economic Data

According to the 1950 census the principal type of farming in the watershed is dairying with some poultry, truck and general farming. There are 325 active or semi-active farms in the watershed of which 87 percent are owner-operated. Some of the rented land is a serious sediment source. A sizable portion of the land is not farmed as intensively as its capability would permit, while some is cropped too severely. The owners of many of these tracts live on the land and have business interests in nearby cities.

The average size farm in the watershed is 94 acres. The farms range in size as follows.

Table 9<sub>1</sub>/ - Range in Size of Farms

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Under 10 acres	--	56 farms
10 to 29 acres	--	64 farms
30 to 49 acres	--	25 farms
50 to 69 acres	--	27 farms
70 to 99 acres	--	32 farms
100 to 139 acres	--	50 farms
140 to 179 acres	--	22 farms
180 to 219 acres	--	18 farms
220 to 259 acres	--	10 farms
260 to 499 acres	--	18 farms
500 to 999 acres	--	2 farms
1,000 acres and over	--	1 farm

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The principal crops grown are corn, wheat and hay, with barley, oats and rye being minor crops. The hay acreage is divided about equally between clover and alfalfa.

Princeton and Pennington are the largest towns in the watershed. Hopewell, with a population of 1800, lies just outside. The total population of the watershed is about 20,000.

About one-fourth of the area is in woodland. One-quarter of this acreage will produce merchantable timber within the next decade. The

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1/ Since Tables 1 through 8 are standard tables in all watershed plans and appear at the end of the report, additional tables included in the text will be numbered, beginning with number 9.

stands are predominantly hardwoods (oak, hickory, tulip poplar.) Cut over tracts or young stands present good possibilities for future production if properly managed to eliminate the naturally poor first stage of the plant succession. The principal values of the woodland in addition to the wood harvest is watershed protection and wildlife habitat.

The wildlife resource is very important. Hunting and fishing are a prevalent recreation of rural and town residents as well as others coming in from nearby Trenton, Princeton, and other cities. Important game species are deer, pheasants, gray squirrels and rabbits. Fishing is quite limited in the watershed and is almost entirely of such warm water species as largemouth bass, bluegill sunfish, bullheads, and the like. The need for more fishing waters is pressing. To help this situation, a local sportsman club proposes to build stream improvement structures on Stony Brook.

The value of the land as farm land is about \$200.00 per acre. However, due to its location with respect to the metropolitan area, and the competition for estates and real estate development, most land is sold at much higher prices.

The road system is well developed with improved roads so that accessibility is no problem. There are two railroads and three commercial airports which serve the area, and trucking facilities are available locally and in nearby Trenton.

Most of the farm buildings are adequate for the farming enterprises. The homes are fairly modern and are generally suitable for the family needs.

This area is well situated insofar as markets are concerned, being within daily delivery distance of New York, Philadelphia, Newark, Trenton, and similar communities.

#### WATERSHED PROBLEMS

##### Floodwater Damage

Flooding in the Stony Brook Watershed occurs where streams flow across the broader shale valleys. Much of the main stem flows through a steep-sided rock-controlled channel which results in a winding stream of high gradient. The low infiltration rates of the soil and the steep gradient of the stream add to the problem of overbank flow in the valley areas. Present use of the land adjacent to the streams is pasture and woodland. The principle damage from floodwater is removal of sections of fences and the deposition of debris on the pasture in the form of logs, trees, and brush, and constitutes a very small financial loss. Since floodwater damages are of minor importance they have not been included in Table 4.

## Sedimentation

Sedimentation has virtually destroyed the communities' recreational use and aesthetic value of two sizable mill ponds on the Stony Brook, and has seriously reduced the effective capacity of Carnegie Lake. The sediment which is not trapped by Carnegie Lake is carried by the Millstone River into the Raritan River and Raritan Bay. It is precipitated by the high salt content of Raritan Bay where it is removed by a dredging operation.

A detailed sedimentation survey of Carnegie Lake was completed in September 1950. The results show that the capacity of the lake has been reduced 24 percent - from 1,256 acre feet to 954 acre feet, not including an estimated 103 acre feet of sediment dredged from the lake during the period 1937-1939. The summary of data for the Carnegie Lake sedimentation survey is shown in Table 10.

Table 10  
 Summary of Sedimentation Data  
 Carnegie Lake, Princeton, N.J.<sup>1/</sup>  
 (Excluding Millstone River Watershed<sup>2/</sup>)

	<u>Quantity</u>	<u>Unit</u>
Age	42.8	year
Drainage Area	47.8	sq.mi.
Reservoir Data		
Area:		
Original	236	acre
Present	236	acre
Storage Capacity at Crest Elevation:		
Original	1,256	ac.ft.
Present	954	ac.ft.
Capacity Per Square Mile of Drainage Area:		
Original	26.3	ac.ft.
Present	20.0	ac.ft.
Sedimentation:		
Total Sediment	405	<sup>4/</sup> ac.ft.
Average Annual Sediment:		
Accumulation	9.5	<sup>4/</sup> ac.ft.
Per Square Mile of Drainage Area <sup>3/</sup>	.2	<sup>4/</sup> ac.ft.
Per Acre of Drainage Area <sup>3/</sup>	13.5	<sup>4/</sup> cu.ft.
By Weight	.34	ton
Depletion of Storage Capacity:		
Per Year	.75	percent
To date of Investigation	32	<sup>4/</sup> percent
To date of Investigation	24	<sup>5/</sup> percent

<sup>1/</sup> Storage began December 5, 1907. Median date of survey, September 21, 1950.

<sup>2/</sup> Gottschalk, L.C. Report on Sedimentation in Lake Carnegie, 1939, accounts for very little sediment production from the Millstone River due to low gradient of stream and numerous low dams located in the channel. These dams catch most of the sediment that is derived from the drainage area.

<sup>3/</sup> Excluding reservoir.

<sup>4/</sup> Includes 103 acre-feet dredged in 1937-1939.

<sup>5/</sup> Actual present depletion.

Erosion Damage

The estimated gross erosion in the watershed is shown in Table 11. This loss has created problems all along the stream and particularly a sedimentation problem in Carnegie Lake.

Table 11 - Estimated Gross Erosion

<u>Type of Erosion</u>	<u>Tons per Year</u>	<u>Percentage</u>
Sheet	158,670	97.4
Gully	2,320	1.4
Streambank	1,595	1.0
Roadbank	250	.2
	<u>Total 162,835</u>	<u>100.0</u>

The amount of sheet erosion in a watershed depends on the nature of the soils, slopes, land use, farming practices, and character of rainfall. The conservation survey indicates that no apparent erosion or slight erosion occurs on 46.5 percent of the area. Erosion has been moderate on 36.1 percent, severe on 11.4 percent, and very severe on 3.2 percent of the area.

Table 12 - Distribution of Erosion on Each Slope Class (in percent of Watershed) Stony Brook Watershed

Degree of Erosion	Slope of Land in Slope Class and Percent							% of Watershed
	A	B	C	D	E	F	Un. design.	
	0-2	2-6	6-12	12-18	18-30	30+	un. design.	
No apparent or slight	17.8	24.8	2.1	.8	.7	.3		46.5
Moderate	.8	31.8	3.2	.2	.1			36.1
Severe		6.0	4.7	.6		.1		11.4
Very Severe		.8	1.6	.7	.1			3.2
Very severely gullied land			.2	.2				.4
Undesignated		.2					2.2	2.4
Percent of Watershed	18.6	62.6	11.8	2.5	.9	.4	2.2	100.0

The very severely gullied land (all cropland or idle land), occurs on C and D slopes. Very severe erosion occurs on B, C, and D slopes from land that is mostly in croplands or idle as shown in Table 13. The severe erosion is found almost entirely on B and C slopes - 80 percent on cultivated land and 20 percent on pasture and woods. Principal sources of erosion and excess runoff on forest land are grazed forests and the area occupied by unstabilized logging roads.

Table 13 - Distribution of Land Use in Each Erosion Group (in Percent)  
Stony Brook Watershed

	:No Apparent: : or Slight : Erosion	: Moderate: : Erosion	: Severe : Erosion	: Very : Severe : Erosion	: Very : Severely : Gullied : Land	: Roads : and : Streams	: % of : Water- : shed
Cropland	13.4	22.0	6.7	1.4	.3		43.8
Pasture	4.5	3.3	1.1	.4			9.3
Woodland	22.0	2.7	1.0	.3			26.0
Idle	5.1	6.2	2.1	.9	.1		14.4
Homestead	1.5	1.9	.5	.2			4.1
Roads and Streams						2.4	2.4
Percent of Watershed	46.5	36.1	11.4	3.2	.4	2.4	100.0

The distribution of gullies by degree of severity in the Stony Brook Watershed is shown in Table 14. The annual loss of soil by gully erosion is estimated to be 2,300 tons or 1.21 acre-feet.

Table 14 - Extent of Gully Erosion in Stony Brook Watershed

	: Acres : Affected	: Percent of : Entire : Watershed
Occasional shallow gullies more than 100 feet apart	2,550	8.3
Frequent shallow gullies less than 100 feet apart	103	.3
Occasional deep gullies <u>1/</u>	176	.6
Frequent deep gullies <u>1/</u>	5	.02

1/ Not crossable with tillage implements.

## Streambank Erosion

A detailed survey of the main channel of Stony Brook and sample surveys on its tributaries showed that streambank erosion is occurring at variable rates in different parts of the watershed. In forested areas bank erosion is negligible. In pasture, however, erosion is considerably accelerated by the trampling of cattle enroute to water. The most severe streambank erosion on the main stem was caused by a channel block of fallen trees that turned the current into one bank and caused rapid cutting. The results of the streambank survey are summarized in Table 15. It is estimated that of the total annual gross erosion in the watershed, 1,595 tons or 1 percent is derived from streambank erosion.

Table 15 - Rate of Streambank Erosion in Stony Brook Watershed

Stream	Stream Length (miles)	Estimated Erosion Rate (ac.ft./yr.)
Upper Stony Brook	4.25	.0232
Peter's Brook	4.25	.0635
Honey Brook	3.50	.0618
Small tributaries (upper watershed)	24.80	.2430
Small tributaries (estates and idle areas near Princeton)	6.80	.0522
Small tributaries (lower watershed)	6.70	.0657
Stony Brook (upper main stem)	5.00	.0655
Stony Brook (lower main stem)	12.00	.2570
TOTAL (Stony Brook and Tributaries)	72.30	.8321

## Roadbank Erosion

Roadbanks are well vegetated throughout the Stony Brook Watershed and are of little importance as sources of sediment. Areas exposed by maintenance grading and new road construction are rapidly healed by roadside planting or by weeds and shrub species that seed in naturally.

## Problems Relating to Drainage, Irrigation and Wildlife

About 40 percent of the watershed soils are somewhat poorly drained. About one-half of this area has slight cropping limitations due to wetness, but improvements to drainage on such areas are not difficult and are practicable. The other half of the wet area is more difficult to drain and requires a more intensive drainage system. Consideration of this fact has been recognized in the recommended land use which will be generally limited to pasture and perennial hay.

About 8 percent of the area is poorly drained. These soils are very difficult to drain. Improvement in internal drainage, in most cases, will be impractical. Only surface drainage can be used and cropping practices should be limited to permanent pasture or wildlife habitat.

The water retained in the desilting basins can be used for irrigation where needed. At the present time there is interest in water for irrigation on some of the high value crops such as nurseries and truck, and as a consequence the storage of water in the sediment control structures will have great value. It is difficult to assign a monetary value for this water use and this has not been done because justification of the structures did not require it.

It is estimated that approximately 400 acre feet of water will be available for irrigation when all desilting basins are installed.

Increased populations of useful wildlife are needed for public recreation. Both phases of the program will help improve the habitat. In addition to the vegetative practices in the land treatment program, the desilting basins will provide added fishing area and resting places for waterfowl. Plans for fish stocking and improvements for waterfowl and furbearers will be adapted to each structure.

### INVESTIGATIONS AND ANALYSES

In developing this Plan, special studies were made of watershed and stream characteristics. These are described below.

#### Hydrologic

The Stony Brook Watershed receives about 45 inches of rainfall in a normal year of which about 15 inches or one-third leaves the watershed as surface runoff. The other 30 inches is accounted for as evaporation, transpiration, infiltration, and deep percolation.

In 1953 the Stony Brook-Millstone Watersheds Association, Incorporated, in cooperation with the United States Geological Survey, Surface Water Branch, installed a water stage recorder controlled by a concrete weir near the lower reach of the Stony Brook. This station was placed in operation on December 15, 1953. During the hurricanes of August 1955 the maximum discharge recorded was 3,390 cubic feet per second;

this being also the maximum for the life of the station. Other flows and their order of magnitude are given in Table 16.

Table 16 - Stony Brook Discharge Flows

Order of Magnitude	Date	Hour	Discharge (cfs)
2	Dec. 14, 1953	Unknown	2500
3	Nov. 21, 1954	1:00 PM	2450
4	Mar. 3, 1954	7:45 PM	1980
5	Mar. 22, 1955	1:15 PM	1800
6	Sept. 11, 1954	12:45 PM	1640

A study of the soil maps established the relationship of certain soil types and their hydrologic characteristics. More than 50 soil types have been mapped in the Stony Brook Watershed. For purposes of hydrologic study, these soil types have been organized into three major groups, each having soils of like hydrologic characteristics. A range of permeability rates was established for each group. Table 17 shows the permeability rates and distribution in the Stony Brook Watershed.

Table 17 - Permeability Rates of Soils  
(Inches per Hour)

Very Slow	Moderately slow to Moderate	Moderately Rapid
Less than .20 in. per hour	.20-2.50 in. per hr.	2.50-5.00 in. per hr.
(acres)	(acres)	(acres)
6,988	20,966	2,654

### Hydraulic

All desilting basins were planned with spillway capacity equivalent to the discharge to be expected once in 100 years based on discharge-frequency curves developed by the Soil Conservation Service. Concrete spillway structures will be either drop or chute type depending on the height of the weir above the streambed. Capacities and concrete quantities were taken from Sections 11 and 14 of the Engineering Handbook of the Soil Conservation Service. Topographic surveys were made at each site and stage-storage curves were prepared.

### Geologic

A preliminary geologic survey was made at each proposed desilting basin site to determine depth to rock, rock formation, type of bedding, permeability which might cause leakage, and availability of borrow.

This survey disclosed that depth to rock varied from 2 to 6 feet, that only minor leakage through the rock would occur and that borrow was available at all sites although the quantity may be limited in one case and require a fairly long haul.

### Sedimentation

The trap efficiency of the desilting basins was made comparable to the average calculated trap efficiency of Carnegie Lake after dredging operations are completed. Desilting basins were designed to have a trap efficiency of from 65 percent to 70 percent. Trap efficiency was determined by the method described in "Trap Efficiency of Reservoirs", Transactions, American Geophysical Union, Vol. 34, No.3, June 1953, pp. 407-418. Soil losses were calculated from the "Probable Soil Loss Formula" of the Soil Conservation Service. After soil losses for the watershed above a desilting basin were determined, a delivery rate of 60 percent was applied and the average annual volume of sediment delivered to site was determined. The average annual deposition in each basin was calculated by applying its trap efficiency to the amount of sediment delivered to the site. The annual deposition was multiplied by the weight-of-soil over weight-of-sediment ratio to determine the annual amount of sediment storage required. The total sediment storage required is equal to the annual storage times the economic life of the structure which is 50 years.

The total storage capacity of each desilting basin is equal to the average sediment storage plus the storage capacity needed to provide the required trap efficiency (65 to 70 percent).

### Economics

Damage schedules covering the flood plain area of Stony Brook were obtained from landowners or operators. These schedules covered land use and crop distribution, yields, and historical data on flooding and flood damages. Analysis of the information obtained showed that little or no damage occurred from flooding.

The monetary value of the physical damage from deposition of sediment in Carnegie Lake is based on the cost of the removal of sediment, taking into account the cost of areas on which disposal of the sediment can be made.

At present there are approximately 500,000 cubic yards of sediment in the Lake. It is the intention of Princeton University to remove this sediment in the near future and the capacity of the Lake will then be comparable to what it was when built. After the sediment is removed the trap efficiency of the Lake will be improved to the point where the annual accumulation will amount to 16,600 cubic yards. The removal of sediment is expected to coincide with the construction of the contemplated desilting basins.

Economic losses resulting from future lake sedimentation are assumed to be equal to the cost of dredging plus the cost of disposal areas. succeeding future dredging costs per cubic yard (including disposal areas) are expected to increase as the availability of nearby spoil areas decreases.

It was estimated that to maintain the Lake in such a condition that no loss in services would result, it would be necessary to carry on dredging operations every time accumulated deposition reached approximately 166,000 cubic yards. This estimate was concurred in by the Department of Buildings and Grounds of Princeton University.

Benefits from reduction of sedimentation in Lake Carnegie attributable to the proposed desilting basins are assumed to be equal to the difference in expected dredging costs, under conditions with the land treatment program in effect and with a combination of land treatment and structural measures.

The reduced volumes of deposition for which dredging costs are calculated are incremental to those expected to prevail as a result of land treatment. The percent reduction in deposition by the structures was used to arrive at the required dredging operations for the 50-year period. The present worth of the total cost of the required dredging operations from varying levels of sediment control over and above that expected from land treatment was calculated and reduced to an annual equivalent value. The annual benefits are assumed to be equal to the annual equivalent value of the required dredging operations.

#### EXISTING WORKS OF IMPROVEMENT

There are no existing or currently proposed works of improvement which will affect or be affected by the works of improvement included in this plan.

#### WORKS OF IMPROVEMENT TO BE INSTALLED

This work plan is designed to meet the needs of the Stony Brook Watershed for erosion control and sediment reduction. Works of improvement include land treatment measures and sediment control measures (desilting basins.)

#### Land Treatment Measures

Based upon the use of each acre of agricultural land within its capabilities and treatment in accordance with its needs, such as is now being carried out by the Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District is essential for sound and continuing sediment reduction and erosion control on the watershed. Basic to the attainment of this objective is the establishment and maintenance of all applicable soil, water and plant management practices essential to proper land use. These measures produce benefits primarily to the land on which installed. Individual landowners and operators normally can, and will, install most of these measures with expectation of favorable

financial returns, if given adequate technical assistance. However, in order to encourage early adoption of the needed measures, cost-sharing is offered through the Agricultural Conservation Program (ACP). The quantities of these measures to be installed will be based on the needs as revealed by the land capability survey and on a realistic estimated amount that can be accomplished in a 10-year period. The Farmer-District Conservation Plan developed by the farmer with the help of the Soil Conservation Service will set forth the practices needed on his unit. Emphasis will be placed on accelerating the establishment of those land treatment practices which directly reduce sediment. The major type of measures to be established are discussed below:

Contour Farming: Contour farming to conserve moisture and reduce erosion is needed on 6,165 acres. Of this amount, 2,775 acres will be applied under this plan.

Strip Cropping: Strip cropping to conserve moisture and reduce runoff and erosion should be practiced on 5,276 acres of cultivated sloping land. This involves the use of conservation rotations which include up to three or four years of hay. Of the above amount, 2,374 acres will be applied under this plan.

Cover Cropping: Cover cropping to prevent erosion, runoff and soil deterioration over the winter should be used successively on the cultivated land and is needed on 1,801 acres. Of this amount, 810 acres will be applied under this plan.

Field Diversions: Field diversions control water flow to prevent erosion, reduce headward development of gullies by diverting water to stabilized channels and protect cultivated areas on the slopes below the diversions. Forty-one miles of diversions are needed and of this amount, 18 miles will be installed under this plan.

Waterway Development: Waterway development to reduce erosion and sedimentation needs to be accomplished on 142 acres. Of this amount, 64 acres will be developed under this plan.

Revegetation (grass): A total of 5,707 acres of the watershed should be seeded or reseeded to permanent type grasses. The area to be seeded includes cropland to be retired to hay and pasture and some existing grassland which will be seeded to more productive grasses and legumes. The effect of this practice under good management will be to improve the grazing capacity and to reduce erosion, runoff, and sediment production. Of the above amount, 2,569 acres of seeding or reseeding will be applied under this plan.

Woodland Protection: Woodland protection provides maximum favorable surface conditions for water retention and infiltration by preserving leaf litter and natural seedling growth, avoiding compaction of surface soil by trampling of livestock, and protection from fire. It also encourages quantity and quality growth of timber trees. The needs of the watershed are 2,175 acres of which 2,080 acres will be protected under this plan.

Tree Planting: Tree planting provides a protective and profitable cover that will prevent erosion, increase infiltration by litter cover and root openings, and reduce runoff on land that is unsuited for field crops or pasture, or that has an inadequate present cover. The total needs in the watershed are 397 acres, of which 280 acres will be planted under this plan.

Woodland Management: Woodland management consists of improving both the density of stocking and quality of trees in the woodlands of the area, using such practices as thinning, weeding, pruning, and preparing surface conditions to encourage natural reseeding. It also includes all activities in the forest area leading to harvesting of forest crops, including supervision of harvest cuttings and the rehabilitation of the logging road system used in removing products. The purpose of this practice is to maintain a healthy growing stand of trees that will furnish maximum effective protective and water retention cover and provide a sustained yield with highest financial return. A total of 5,000 acres will be managed under this plan.

Conservation Crop Rotation: Growing different crops in a rotation or sequence where the soil-improving crops at least offset the soil-depleting crops in their effect on the soil. Emphasis is given to the type of crops that provide maximum protection during seasons of the year when the erosion hazards are greatest. In general the number of years the land is growing grasses and legumes should be progressively greater as the erosion hazards increase. A total of 4,195 acres will be established under this plan.

Wildlife Borders: Wildlife borders are strips of herbaceous plants or woody shrubs along borders of fields or woodlands to conserve soil and provide food and cover for wildlife. A total of 10 acres will be established under this plan.

Hedges: The planting of shrubs or trees close together in a line across open fields or along their edges to slow the flow of water, establish guidelines, delineate field boundaries, serve as living fences, or to provide food and cover for wildlife. A total of 6 miles will be established under this plan.

Other Measures: Other land treatment measures that are less directly important in reducing sedimentation will round out the needed land treatment program. These include stubble mulching, fertilization, irrigation, rotation grazing, deferred grazing, pasture improvement, wildlife area improvement, fish pond improvement, open and closed drains, pond construction, channel improvement and land clearing. These measures will be installed to provide for a balanced, comprehensive conservation program on the watershed. Their benefits are largely increased production of farm products and wildlife. Most of their benefit will accrue directly to individual farmers.

The estimated total cost of planning and installing these measures is \$257,017 as shown in Table 1.

### Structural Measures for Sediment Control

Approximately 20 sites were investigated. Of those investigated, nine were finally selected for inclusion in the program. The selection of each site was based on topography, geology, and the amount of sediment each would trap in comparison to the cost of the structure.

The nine desilting basins will reduce the annual accumulation of sediment in Carnegie Lake about 53 percent. Sufficient storage can be developed at all structures to provide the required trap efficiency and store the expected sediment yield for a period of fifty years.

The impounding structures will be compacted earth fill dams with concrete spillways. Spillways with drops up to 10 feet will have a vertical drop structure. Where drops greater than 10 feet occur, chute spillways will be used. All spillways will have a stilling basin to prevent channel erosion below the structure. The flooded area will be cleared of trees and brush. The earth fill will be seeded and maintained in sod.

Sites for the desilting basins will be provided by local interests. The value of these sites is estimated to be \$11,000 based on a price of \$100 per acre from market values furnished by local people. The total estimated cost of installing these structures is \$244,837. The annual equivalent cost, including operation and maintenance is \$7,082.

### Effects of Worksof Improvement on Damages and Benefits

The installation of land treatment measures and desilting basins described above will reduce the expected annual deposit of sediment in Carnegie Lake approximately 12,174 cubic yards or about 73 percent.

The estimated average direct sediment damage is expected to be reduced from \$19,233 to \$3,314. About 27 percent of this reduction is due to land treatment measures and 73 percent is due to the effect of the desilting basins.

\$19,233	- Estimated average annual damages without project.
\$14,964	- Estimated average annual damage with land treatment measures only.
\$3,314	- Estimated average annual damage with project.

There is no plan for a comprehensive development of the Raritan River Basin of which Stony Brook is a monir tributary.

## COMPARISON OF BENEFITS AND COSTS

When the structural measures for sediment control are installed and operating at full effectiveness the ratio of the average annual benefit, \$11,650 to the average annual cost of the measures \$7,082 is about 1.65 : 1, based on long-term price levels for benefits and cost prices. The benefit cost ratios for individual structures are shown below.

<u>Order</u>	<u>Site No.</u>	<u>Benefit Cost Ratio</u>
1	14	2.81 : 1
2	2	2.60 : 1
3	4	1.64 : 1
4	8	1.54 : 1
5	16	1.57 : 1
6	10	1.46 : 1
7	7	1.15 : 1
8	11a	1.10 : 1
9	6	1.06 : 1

In addition to the average annual monetary benefits claimed for sediment reduction, there are other substantial tangible and intangible values which will accrue from the program. There is interest in the use of water for irrigation from several of these desilting basins. Since the irrigation will be applied to high valued crops such as nursery stock, available water will have a higher value than it would have if applied to general farm crops. These impoundments will offer a varied type of outdoor recreation that will fulfill a real need in the metropolitan areas in and adjacent to the watershed.

There will be water for fire protection available to four small communities and a large number of farms. Other uses will include water for livestock, spraying, fish, wildlife, and supplementary potable water supply for the Pennington Community. In addition there will be aesthetic values accruing from the development of numerous bodies of water in a community devoid of natural lakes.

### ACCOMPLISHING THE PLAN

#### Education and Information

The Extension Service will be looked to for leadership in carrying out the educational program, through meetings, press releases, and other forms of disseminating information.

The Stony Brook-Millstone Watersheds Association will be active in the educational and promotional phases of the program with newsletters, publicity releases, meetings, and personal contacts.

The Soil Conservation Service will assist by providing accurate information concerning soil and water conservation, the effectiveness of the various measures, and the work of the Soil Conservation Service regarding watershed protection.

The educational and informational program will be aimed at helping to achieve an understanding of the plan and participation in the program by the landowners and operators in the watershed and other interested people and groups in order to facilitate the full accomplishment of the program.

### Land Treatment Measures

Land treatment measures itemized in Table 1 will be established on the land by the farm owners and operators in cooperation with the Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District. The cost of applying these measures will be borne by the landowners and operators. It is expected that they will be reimbursed for a portion of this cost through the Agricultural Conservation Program of the Agricultural Stabilization and Conservation Service. The amount of the reimbursement to be expected is not included in the estimated non-Federal cost for land treatment as listed in Table 1. To avoid possible inclusion of cost-sharing funds, the costs of land treatment in Table 1 are 50 percent of the total actual costs. Therefore, to the extent that cost-sharing is not used, the estimates of costs are low. The Soil Conservation Districts are giving assistance in the planning and application of these measures under their going programs. This assistance will be accelerated so as to assure planning and application of the needed measures within the installation period of the project.

The Soil Conservation Service will furnish additional technical assistance to the Districts to assist cooperating landowners and operators in accelerating the preparation and application of soil and water conservation plans.

The Farmers Home Administration soil and water conservation loan program is available to all eligible farmers in the watershed.

The Hunterdon and Mercer County Agricultural Stabilization and Conservation Committees will cooperate with the governing bodies of the Soil Conservation Districts by providing financial assistance for those practices which will help accomplish the conservation objectives, where this is desired by landowners. The amount of financial assistance for the practices included in Table 1 and which has been excluded from the estimated cost is as follows:

	(1956 A.C.P. Program)
Contour Farming	- \$3.50 per acre
Strip Cropping	5.00 per acre
Cover Crops	2.00 per acre
Field Diversions	200.00 per mile
Pasture Planting	8.00+ per acre
Per. Hay Planting	8.00+ per acre
Waterway Development	100.00 per acre
Tree Planting	20.00 per acre
Fencing Plantings	25.00 per acre
Fencing Forest	8.50 per acre
Improved Forest Mgt.	9.00 per acre

The State Soil Conservation Committee will assist in the accomplishment of the plan through the performance of their duties as provided for in the Soil Conservation Act, State of New Jersey.

The Section of Forestry Cooperation of the New Jersey Department of Conservation and Economic Development, in cooperation with the United States Forest Service, will provide the technical assistance needed to assist landowners in installing recommended forest land measures.

Division of Fish and Game will cooperate by supplying technical assistance in application of the biological phases of the plan. Through the Division's Fish and Game program, trees, wildlife shrubs, seed and other vegetative plantings for the improvement of wildlife habitats will be provided.

State Geologist will make available technical services and advise in accomplishing the plan.

#### Structural Measures for Sediment Control

The Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District have been qualified by the New Jersey State Attorney General as organizations legally authorized to sponsor watershed projects under Public Law 566.

The Board of Chosen Freeholders of Mercer County has accepted the contracting obligation and the Board of Chosen Freeholders of Hunterdon County has agreed to accept it at such time as construction is scheduled.

Funds for the local share of the construction costs will be raised by the Stony Brook-Millstone Watersheds Association, Incorporated, and this group will be responsible for obtaining easements and rights-of-way.

Under a separate project the United States Geological Survey, Quality of Water Branch, will cooperate with the New Jersey Department of Conservation and Economic Development with funds provided by the Watershed Association and Princeton University in establishing a system of sediment, rainfall and frost measuring stations throughout the watershed.

Technical specialists will be provided by the Soil Conservation Service to assist in planning, design, preparation of specifications, supervision of construction, preparation of contract payment estimates, making final inspection, execution of certificates of completion, and to perform related duties for the establishment of the planned structural measures.

New Jersey Division of Water Policy and Supply will provide review and approval of designs and plans and issue permits for construction.

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

### PROVISIONS FOR OPERATION AND MAINTENANCE

#### Land Treatment Measures

Land treatment measures will be operated and maintained by the landowners or operators of the farms on which the measures are installed under agreements with the Freehold Soil Conservation District and the Mid-Jersey Soil Conservation District. Representatives of the Soil Conservation Districts will make periodic inspections of the land treatment measures to determine maintenance needs and will encourage landowners and operators to perform required maintenance.

#### Structural Measures for Sediment Control

The Mid-Jersey Soil Conservation District will accept responsibility for the operation and maintenance of the two structures located in Hunterdon County, and the Freehold Soil Conservation District will accept responsibility for the operation and maintenance of the seven structures located in Mercer County. Both Districts will enter into detailed agreements with the Watershed Association prior to the issuance of invitations to bid under which the Association will give assurance of the operation and maintenance funds.

The Watershed Association has at present a \$10,000 annual budget made up of individual and organizational contributions which it can draw from for such purposes. It can also enlist special contributions as it has successfully done on several occasions during the past six years. In addition to this source of operation and maintenance funds, the Watershed Association can reasonably expect financial and service type of assistance from the local boroughs, townships and counties.

A continual observation and inspection will be maintained by the landowners on which the structures are located. An inspection following storms that may produce damage will be made jointly by Soil Conservation Service personnel and a Watershed Association employee.

The District Supervisors or their representatives will make annual inspections of the structures in order to determine the adequacy of the maintenance program. The Districts will maintain a record of maintenance inspections and maintenance operations and make it available to Soil Conservation Service personnel.

The estimated annual operation and maintenance costs for the two structures in Hunterdon County are \$136 and for the seven structures in Mercer County, \$576.

Operation and maintenance will be accomplished by local labor under force account, or by landowners under agreement with the Watershed Association. The structures will be the property of the landowners. The easements will give right of ingress and egress for operations and maintenance. They also provide for the landowners to furnish and maintain fence to exclude their livestock from the reservoir areas as well as to carry out the necessary practices to maintain a good permanent sod on the earth embankments.

#### COST-SHARING

Table B shows that 98.7 percent of the sediment reduction benefits attributable to the desilting basins are community type, or Class 1-B benefits. The assignment of these benefits to Class 1-B was based upon the fact that the ultimate beneficiaries are not definable. While Lake Carnegie is owned by Princeton University, all dredging cost in the past, and in the future, will be paid for by popular subscription. These subscribers enjoy the Lake and the opportunity that it affords for recreation, including fishing, boating, skating, and swimming.

The local people, through the Stony Brook-Millstone Watersheds Association, have agreed to assume 30 percent of the construction costs attributable to the community type or, 1-B benefit. Based on the present estimated construction cost of \$187,050, the local cost-sharing will amount to \$57,533. This will be in addition to \$2,700 for contracting costs, \$15,295 for operation and maintenance capitalized over the life of the structures, and \$11,000 for easements and rights-of-way.

The immediate local or class 1-A benefits are identifiable in view of the fact that they accrue to property immediately below one of the structures. This is a commercial swimming pool and picnicking ground. The construction costs allocable to the 1-A benefits amounts to \$2,432 which will be paid for by the local people and is included in the \$57,533 shown above.

TABLE A - LAND TREATMENT COSTS

Stony Brook Watershed, New Jersey

Type of Cost	Federal Cost	Non-Federal Cost	Total Cost
	(Dollars)	(Dollars)	(Dollars)
<u>Non-Federal Lands</u>			
1. Technical assistance	35,773	9,065	44,838
2. Installation Costs <u>1/</u>		212,179	212,179
Total	35,773	221,244	257,017

1/ This cost is exclusive of any reimbursement from ACP or other Federal funds.

January 1956

TABLE B - DISTRIBUTION OF AVERAGE ANNUAL BENEFITS AND ALLOCATION  
OF CONSTRUCTION COSTS BY PURPOSE AND BY CLASSES OF BENEFITS

Stony Brook Watershed, New Jersey

Step A	Distribution of Average Annual Benefits			
	Class of Benefits	Purpose		Total
(Dollars)		(Percent)	(Dollars)	
	150	1.3	150	
Class 1A Benefits	11,500	98.7	11,500	
Class 1B Benefits	11,650	100.	11,650	
Total				

Step B	Allocation of Construction Costs			
	Class of Benefits	Purpose		Total
(Percent)		(Dollars)	(Dollars)	
	1.3	2,432	2,432	
Class 1A Benefits	98.7	184,618	184,618	
Class 1B Benefits	100.	187,050	187,050	
Total				

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TABLE C - BENEFITS AND ALLOCATED CONSTRUCTION COSTS

Stony Brook Watershed, New Jersey

Class of Benefits	Benefits		Allocated Construction Costs	
	(Dollars)	(Percent)	(Dollars)	(Percent)
1. Class 1-A	150	1.3	2,432	1.3
2. Class 1-B	11,500	98.7	184,618	98.7
Total	11,650	100.	187,050	100.

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TABLE D - REQUIRED NON-FEDERAL COSTS

Stony Brook Watershed, New Jersey

Type of Cost	Cost or Appraised Value
	(Dollars)
1. Land, easements and rights-of-way	11,000
2. Capitalized value of operation and maintenance during expected life of improvements (712 x 21.48218)	15,295
3. Cost of administering contracts	2,700
Total	28,995

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TABLE E - INSTALLATION SERVICES

Stony Brook Watershed, New Jersey

Agency	:	Cost	:	Total
	:	(Dollars)	:	(Dollars)
Soil Conservation Service	:	44,087	:	44,087
Total	:	44,087	:	44,087

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TABLE F - PROPOSED ADJUSTMENT IN FEDERAL, AND NON-FEDERAL COSTS

Stony Brook Watershed, New Jersey

Reason for Adjustment	: Transfer from : Federal to : non-Federal : (Dollars)	: Transfer from : non-Federal : to Federal : (Dollars)
1. Class 1B- *	: 55,101	:
2. Class 2	:	:
Total	: 55,101	:
	:	:

\*The local people through the Stony Brook-Millstone Watershed Association are willing to assume financial responsibility to the extent of their ability, and in addition to large contributions required for dredging Carnegie Lake, propose to pay this portion of the cost allocated to the Federal Government.

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TABLE G - PROPOSED COST-SHARING

Stony Brook Watershed, New Jersey

Type of Cost	Federal Cost	Non- Federal Cost	Total Cost
	(Dollars)	(Dollars)	(Dollars)
<u>COST FOR STRUCTURAL MEASURES</u>			
1. Required non-Federal Costs		28,995	28,995
2. Installation Services	44,087		44,087
3. Subtotal, items 1 and 2	44,087	28,995	73,082
Allocation of Construction Costs:			
4. Costs allocated to Class 1A benefits		2,432	2,432
5. Costs allocated to Class 1B benefits	184,618		184,618
6. Costs allocated to Class 2 benefits	0	0	0
7. Subtotal, items 4, 5, 6	184,618	2,432	187,050
Recommended Adjustments of Construction Costs			
8. Decrease of Federal Cost	55,101		
9. Increase of non-Federal Cost		55,101	
10. Subtotal, items 8, 9	55,101	55,101	
11. Total Cost Sharing for Structural Measures	173,604	86,528	260,132
<u>COST FOR LAND TREATMENT MEASURES</u>			
12. Non-Federal Lands	35,773	221,244	257,017
13. Subtotal	35,773	221,244	257,017
14. Grand Total Project Cost- Sharing	209,377	307,772	517,149

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TABLE 1 - ESTIMATED INSTALLATION COSTS

Stony Brook Watershed - New Jersey  
(1954 Costs)

For: First year

Items	Unit	No. to be applied		Estimated Cost		
		Total	Federal	non-Federal	Total	
					1/	
<b>LAND TREATMENT</b>						
Soil Conservation Service:						
Land Treatment Measures						
Contour Farming	acre	370		1295		1295
Strip Cropping	acre	300		600		600
Cover Cropping	acre	100		500		500
Field Diversions	mile	3		600		600
Revegetation						
(a) Pasture Planting	acre	200		3500		3500
(b) Per. Hay Planting	acre	140		2450		2450
Cons. Crop Rotation	acre	550		8250		8250
Wildlife Borders	acre	1		40		40
Hedges	mile	1		200		200
Waterway Dev.	acre	8		800		800
Technical Assistance	acre	1143	3912			3912
SCS Subtotal			3912	18235		22147
Forest Service:						
Land Treatment Measures						
Tree Planting	acre	40		800		800
Fencing Plantations	acre	40		1000		1000
Fencing Forest Land	acre	300		2550		2550
Improved Forest Mgt.	acre	1000		9000		9000
Stabilizing Logging Roads	mile	1		300		300
Technical Assistance			1798	1792		3590
FS Subtotal			1798	15442		17240
<b>TOTAL LAND TREATMENT</b>			5710	33677		39387
<b>STRUCTURAL MEASURES</b>						
Soil Conservation Service:						
Waterflow Control						
Desilting Basins	No.	2 & 4	17324	7697		25021
SCS Subtotal			17324	7697		25021
<b>TOTAL CONSTRUCTION COSTS</b>			17324	7697		25021
<b>INSTALLATION SERVICES</b>						
Total SCS			5897	500		6397
<b>TOTAL INSTALLATION SERVICES</b>			5897	500		6397
<b>OTHER COSTS</b>				1800		1800
<b>TOTAL STRUCTURAL MEASURES</b>			23221	9997		33218
<b>GRAND TOTAL</b>			28931	43674		72605
<b>SUMMARY</b>						
Total SCS			27133	28232		55365
Total FS			1798	15442		17240
<b>TOTAL</b>			28931	43674		72605

1/ Exclusive of any reimbursement from ACP or other Federal funds.

TABLE 1 - ESTIMATED INSTALLATION COSTS

Stony Brook Watershed - New Jersey

(1954 Costs)

For: Second Year

Items	Unit	No. to be applied	Estimated C o s t		
			Total	Federal	non-Federal
<u>LAND TREATMENT</u>					
Soil Conservation Service:					
Land Treatment Measures					
Contour Farming	acre	370		1295	1295
Strip Cropping	acre	300		600	600
Cover Cropping	acre	100		500	500
Field Diversions	mile	3		600	600
Revegetation					
(a) Pasture Planting	acre	200		3500	3500
(b) Per. Hay Planting	acre	140		2450	2450
Cons. Crop Rotation	acre	550		8250	8250
Wildlife Borders	acre	1		40	40
Hedges	mile	1		200	200
Waterway Dev.	acre	9		900	900
Technical Assistance	acre	1145	3917		3917
SCS Subtotal			3917	18335	22252
Forest Service:					
Land Treatment Measures					
Tree Planting	acre	60		1200	1200
Fencing Plantations	acre	60		1500	1500
Fencing Forest Land	acre	300		2550	2550
Improved Forest Mgt.	acre	1000		9000	9000
Stabilizing Logging Roads	mile	1		300	300
Technical Assistance			1821	1814	3635
FS Subtotal			1821	16364	18185
<u>TOTAL LAND TREATMENT</u>			<u>5738</u>	<u>34699</u>	<u>40437</u>
<u>STRUCTURAL MEASURES</u>					
Soil Conservation Service:					
Waterflow Control					
Desilting Basins	No.	14 & 16	29518	13109	42627
SCS Subtotal			29518	13109	42627
<u>TOTAL CONSTRUCTION COSTS</u>			<u>29518</u>	<u>13109</u>	<u>42627</u>
<u>INSTALLATION SERVICES</u>					
Total SCS			10047	600	10647
<u>TOTAL INSTALLATION SERVICES</u>			<u>10047</u>	<u>600</u>	<u>10647</u>
<u>OTHER COSTS</u>					
<u>TOTAL STRUCTURAL MEASURES</u>			<u>39565</u>	<u>17909</u>	<u>57474</u>
<u>GRAND TOTAL</u>			<u>45303</u>	<u>52608</u>	<u>97911</u>
<u>SUMMARY</u>					
Total SCS			43482	36244	79726
Total FS			1821	16364	18185
<u>TOTAL</u>			<u>45303</u>	<u>52608</u>	<u>97911</u>

1/ Exclusive of any reimbursement from ACP or other Federal funds.

TABLE 1 - ESTIMATED INSTALLATION COSTS

Stony Brook Watershed - New Jersey

(1954 Costs)

For: Third year

Items	Unit	No. to be applied		Estimated Costs		
		Total	Federal	Federal	Total	Total
<u>LAND TREATMENT</u>						
Soil Conservation Service:						
Land Treatment Measures						
Contour Farming	acre	370		1295		1295
Strip Cropping	acre	300		600		600
Cover Cropping	acre	100		500		500
Field Diversions	mile	3		600		600
Revegetation						
(a) Pasture Planting	acre	200		3500		3500
(b) Per. Hay Planting	acre	140		2450		2450
Cons. Crop Rotation	acre	550		8250		8250
Wildlife Borders	acre	1		40		40
Hedges	mile	1		200		200
Waterway dev.	acre	9		900		900
Technical Assistance	acre	1145		3917		3917
SCS Subtotal				3917	18335	22252
Forest Service:						
Land Treatment Measures						
Tree Planting	acre	60		1200		1200
Fencing Plantations	acre	60		1500		1500
Fencing Forest Land	acre	400		3400		3400
Improved Forest Mgt.	acre	1000		9000		9000
Stabilizing Logging Roads	mile	1		300		300
Technical Assistance				1833	1827	3660
FS Subtotal				1833	17227	19060
<u>TOTAL LAND TREATMENT</u>				<u>5750</u>	<u>35562</u>	<u>41312</u>
<u>STRUCTURAL MEASURES</u>						
Soil Conservation Service:						
Waterflow Control						
Desilting Basins	No.	#8		16053	7131	23184
SCS Subtotal				16053	7131	23184
<u>TOTAL CONSTRUCTION COSTS</u>				<u>16053</u>	<u>7131</u>	<u>23184</u>
<u>INSTALLATION SERVICES</u>						
Total SCS				5465	300	5765
<u>TOTAL INSTALLATION SERVICES</u>				<u>5465</u>	<u>300</u>	<u>5765</u>
<u>OTHER COSTS</u>					1900	1900
<u>TOTAL STRUCTURAL MEASURES</u>				<u>21518</u>	<u>9331</u>	<u>30849</u>
<u>GRAND TOTAL</u>				<u>27268</u>	<u>44893</u>	<u>72161</u>
<u>SUMMARY</u>						
Total SCS				25435	27666	53101
Total FS				1833	17227	19060
<u>TOTAL</u>				<u>27268</u>	<u>44893</u>	<u>72161</u>

1/ Exclusive of any reimbursement from ACP or other Federal funds.

TABLE 1 - ESTIMATED INSTALLATION COSTS

Stony Brook Watershed, New Jersey

(1954 Costs)

For: Remaining Years

Items	Unit	No. to be applied		Estimated Cost		
		Total	Federal	non-Federal	Total	
<u>LAND TREATMENT</u>						
Soil Conservation Service:						
Land Treatment Measures						
Contour Farming	acre	1665		5827		5827
Strip Cropping	acre	1474		2950		2950
Cover Cropping	acre	510		2550		2550
Field Diversions	mile	9		1800		1800
Revegetation						
(a) Pasture Planting	acre	925		16195		16195
(b) Per. Hay Planting	acre	624		10920		10920
Cons. Crop Rotation	acre	2545		38182		38182
Wildlife Borders	acre	7		300		300
Hedges	mile	3		600		600
Waterway dev.	acre	38		3850		3850
Technical Assistance	acre	4366	14937			14937
SCS Subtotal				14937	83174	98111
Forest Service:						
Land Treatment Measures						
Tree Planting	acre	120		2400		2400
Fencing Plantations	acre	120		3000		3000
Fencing Forest Land	acre	800		6800		6800
Improved Forest Mgt.	acre	2000		18000		18000
Stabilizing Logging Roads	mile	1		300		300
Technical Assistance				3638	3632	7270
FS Subtotal				3638	34132	37770
<u>TOTAL LAND TREATMENT</u>				18575	117306	135881
<u>STRUCTURAL MEASURES</u>						
Soil Conservation Service:						
Waterflow Control						
Desilting Basins	each	4		66622	29596	96218
SCS Subtotal				66622	29596	96218
<u>TOTAL CONSTRUCTION COSTS</u>				66622	29596	96218
<u>INSTALLATION SERVICES</u>						
Total SCS				22678	1300	23978
<u>TOTAL INSTALLATION SERVICES</u>				22678	1300	23978
<u>OTHER COSTS</u>						
<u>TOTAL STRUCTURAL MEASURES</u>				89300	33996	123296
<u>GRAND TOTAL</u>				107875	151302	259177
<u>SUMMARY</u>						
Total SCS				104237	117170	221407
Total FS				3638	34132	37770
<u>TOTAL</u>				107875	151302	259177

1/ Exclusive of any reimbursement from ACP or other Federal funds.

**TABLE 1 - ESTIMATED INSTALLATION COSTS**

**Stony Brook Watershed - New Jersey**

(1954 Costs)

For: Total Program

Items	Unit	No. to be		Estimated Costs		
		applied	Total	Federal	Federal	Total
<b>LAND TREATMENT</b>						
Soil Conservation Service:						
Land Treatment Measures						
Contour Farming	acre	2775			9712	9712
Strip Cropping	acre	2374			4750	4750
Cover Cropping	acre	810			4050	4050
Field Diversions	mile	18			3600	3600
Revegetation						
(a) Pasture Planting	acre	1525			26695	26695
(b) Per. Hay Planting	acre	1044			18270	18270
Cons. Crop Rotation	acre	4195			62932	62932
Wildlife Borders	acre	10			420	420
Hedges	mile	6			1200	1200
Waterway Dev.	acre	64			6450	6450
Technical Assistance				26683		26683
SCS Subtotal				26683	138079	164762
Forest Service:						
Land Treatment Measures						
Tree Planting	acre	280			5600	5600
Fencing Plantation	acre	280			7000	7000
Fencing Forest Land	acre	1800			15300	15300
Improved Forest Mgt.	acre	5000			45000	45000
Stabilizing Logging Roads	mile	4			1200	1200
Technical Assistance				9090	9065	18155
FS Subtotal				9090	83165	92255
<b>TOTAL LAND TREATMENT</b>				<b>35773</b>	<b>221244</b>	<b>257017</b>
<b>STRUCTURAL MEASURES</b>						
Soil Conservation Service:						
Waterflow Control						
Desilting Basins	each	9		129517	57533	187050
SCS Subtotal				129517	57533	187050
<b>TOTAL CONSTRUCTION COSTS</b>				<b>129517</b>	<b>57533</b>	<b>187050</b>
<b>INSTALLATION SERVICES</b>						
Total SCS				44087	2700	46787
<b>TOTAL INSTALLATION SERVICES</b>				<b>44087</b>	<b>2700</b>	<b>46787</b>
<b>OTHER COSTS</b>					<b>11000</b>	<b>11000</b>
<b>TOTAL STRUCTURAL MEASURES</b>				<b>173604</b>	<b>71233</b>	<b>244837</b>
<b>GRAND TOTAL</b>				<b>209377</b>	<b>292477</b>	<b>501854</b>
<b>SUMMARY</b>						
Total SCS				200287	209312	409599
Total FS				9090	83165	92255
<b>TOTAL</b>				<b>209377</b>	<b>292477</b>	<b>501854</b>

1/ Exclusive of any reimbursement from ACP or other Federal funds.

TABLE 2 - STATUS OF WATERSHED WORKS OF IMPROVEMENT

Stony Brook Watershed, New Jersey

Measure	Unit	Applied to date	Total non- Federal Cost <u>1/</u>
			(Dollars)
Contour Farming	acres	671	3,355
Strip Cropping	acres	353	2,471
Cover Cropping	acres	262	2,620
Field Diversions	miles	12	4,800
Waterway Dev.	acres	6	1,200
Pasture Planting	acres	214	7,490
Per. Hay Planting	acres	321	11,235
Cons. Crop Rotation	acres	848	12,720
Wildlife Borders	acres	7	294
Hedges	miles	1	40
Stubble Mulch	acres	395	1,975
Wildlife Area Imp.	acres	91	910
Open Drains	miles	2	800
Closed Drains	lin.ft.	13,445	3,361
Pond Construction	No.	26	7,800
Channel Imp.	lin.ft.	2,000	1,000
Land Clearing	acres	36	1,800
Rotation Grazing	acres	237	1,185
Woodland Protection	acres	325	4,875
Tree Planting	acres	96	3,840
Woodland Management	acres	347	130
Total			73,901

1/ This cost includes any reimbursement from ACP or other Federal funds.

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TABLE 3 - ANNUAL COSTS

Stony Brook Watershed, New Jersey

(Long Term Prices)

Measures	AMORTIZATION OF INSTALLATION COSTS			OPERATION AND MAINTENANCE COSTS			
	Federal	non-Federal	Total	Federal	non-Federal	Total	Total
	(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)
STRUCTURAL MEASURES							
Desilting Basins							
Site No.							
14	690	421	1,111	0	135	135	1,246
2	146	89	235	0	34	34	269
4	407	225	632	0	68	68	700
8	512	293	805	0	135	135	940
16	252	142	394	0	68	68	462
10	529	278	807	0	68	68	875
7	416	211	627	0	68	68	695
11a	653	323	976	0	68	68	1,044
6	527	256	783	0	68	68	851
Total SCS	4,132	2,238	6,370	0	712	712	7,082
Grand Total	4,132	2,238	6,370	0	712	712	7,082

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TABLE 5 - BENEFIT COST ANALYSIS

Stony Brook Watershed, New Jersey

(Long term Costs and Benefits)

	: Average	: Average	: Benefit
	: Annual	: Annual	: Cost
	: <u>Benefits</u>	: Cost	: Ratio
	: Sediment		
	: (Dollars)	: (Dollars)	
<u>STRUCTURAL MEASURES FOR</u>			
<u>FLOOD PREVENTION</u>			
Waterflow Control			
Desilting Basins			
Structure No. 14	: 3,500	: 1,246	: 2.81:1
2	: 700	: 269	: 2.60:1
4	: 1,150	: 700	: 1.64:1
8	: 1,450	: 940	: 1.54:1
16	: 725	: 462	: 1.57:1
10	: 1,275	: 875	: 1.46:1
7	: 800	: 695	: 1.15:1
11a	: 1,150	: 1,044	: 1.10:1
6	: 900	: 851	: 1.06:1
Subtotal	: 11,650	: 7,082	: 1.65:1
TOTAL STRUCTURAL MEASURES			
FOR FLOOD PREVENTION	: 11,650	: 7,082	: 1.65:1

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TABLE 6 STRUCTURE DATA  
 Preliminary Estimates For  
 Desilting Basins  
 Stony Brook Watershed, New Jersey

Drainage No.	Age	Storage Capacity	Surface Area	Max. Ht. of Dam	Floodplain Area Inundated	Volume of Fill	Principal Spillway	Type						
Area		Sed. Stor.	Top Sed. Pool	Top Det. Pool	Under Sed. Det. Pool	of Sed. Det. Total	Size: Max. Dis. Cap.	Emergency Spillway						
sq. mi.	years	feet	acres	ft.	acres	c.y.	sq. ft.	cfs						
14	3.8	108	22	130	30	35	12.4	30	35	35	20,000	168	1360	Chute
2	0.38	15	2	17	5.5	6	8.5	5.5	6	6	1,400	63	290	Drop
4	1.7	37	26	63	9.5	12	13.0	9.5	12	12	9,500	138	1125	Chute
8	1.4	44	15	59	14	19	14.0	14	19	19	11,600	102	795	Chute
16	0.5	21	3	24	7	7	11.0	7	7	7	6,000	80	550	Chute
10	2.2	38	39	77	8	12	14.0	8	12	12	15,000	150	1212	Chute
7	0.66	24	5	29	5	6	16.0	5	6	6	13,000	75	550	Chute
11a	0.93	34	7	41	8	9	15.4	8	9	9	24,000	94	675	Chute
6	1.08	24	16	40	4	6	13.6	4	6	6	16,000	101	723	Chute

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TABLE 6 B - STRUCTURE DATA

Estimated Structure Cost Distribution

Stony Brook Watershed, New Jersey

Structure No.	Total Contract	Federal Installation Costs										non-Federal Installation Costs									
		Total Contract	Continuances	Construction	Federal Contract	Installation	Construction	Adm. & Misc.	Total Federal	Contract	Adm. of	Ease-ment & R/W	Construction	Total Contract							
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)							
14	27880	3545	31225	19306	6245	2317	1115	28983	8574	300	3500	1029	13403	42336							
2	5900	708	6608	4085	1321	490	236	6132	1815	200	600	218	2833	8965							
4	16440	1973	18413	11333	3683	1366	657	17089	5057	300	1200	607	7174	24253							
8	20700	2484	23184	14333	4637	1720	828	21513	6367	300	1900	764	9331	30849							
16	10180	1221	11401	7043	2230	846	407	10582	3131	300	700	375	4506	15088							
10	21370	2564	23934	14797	4787	1776	854	22214	6573	300	1200	788	8861	31075							
7	16840	2021	18861	11660	3772	1399	673	17504	5180	300	600	622	6702	24206							
11a	26380	3166	29546	18266	5909	2192	1055	27422	8114	300	900	974	10288	37710							
6	21320	2558	23878	14761	4776	1771	852	22160	6558	400	400	787	8145	20306							
TOTAL:	167010	20040	187050	115640	37410	13877	6677	173604	51369	2700	11000	6164	71233	244837							

TABLE 7 - SUMMARY OF PHYSICAL DATA

Stony Brook Watershed, New Jersey

Item	Unit	Quantity without Program	Quantity with Program
Watershed Area	Sq. mi.	47.8	xxx
Watershed Area	Ac.	30,604	xxx
Area of Cropland	Ac.	13,411	12,318
Area of Grassland	Ac.	2,842	5,411
Area of Woodland & Wildlife	Ac.	7,989	8,269
Area of Idle Land	Ac.	4,419	2,418
Farmsteads & other	Ac.	1,943	2,188
Annual rate of erosion			
Sheet	Tons/yr.	158,670	111,000
Gully	Tons/yr.	2,320	1,624
Streambank	Tons/yr.	1,595	1,116
Roadbank	Tons/yr.	250	175
Area damaged annually by:			
Sheet erosion	Ac.	16,373	11,134
Gully	Ac.	122	83
Sediment	Ac.	256	174
Sediment Production	Tons/Ac/Yr.	5.3	3.6
Sediment accumulation in lake	Ac/ft/yr.	9.47	3.3
Average Annual Rainfall	Inches	45	45
Average Annual Surface Runoff	Inches	15	13.9

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TABLE 8 SUMMARY OF PLAN DATA

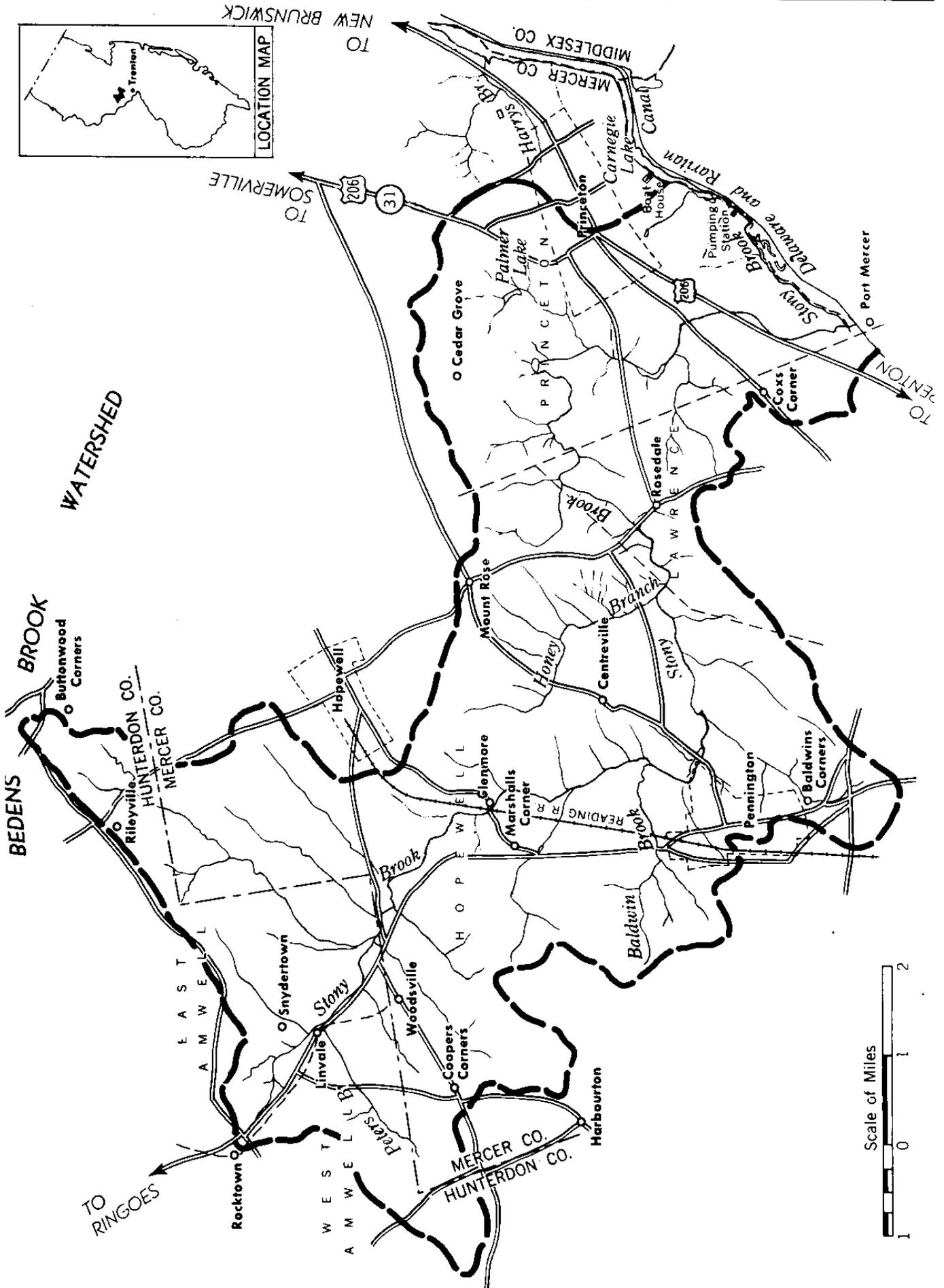
Stony Brook Watershed, New Jersey

Item	Unit	Quantity
Years to complete program	year	10
Total installation cost (structures)		
Federal	Dollars	129,517
non-Federal	Dollars	57,533
Annual O&M Cost (structures)		
non-Federal	Dollars	712
Annual Benefits	Dollars	11,650
Structural Measures		
Desilting Basins	No.	9
Area inundated by structures		
Upland:		
Total pool (weir height)	acres	110
Watershed area above structures	acres	8,091
Reduction of sediment damage		
Land treatment measures	percent	27
Structural measures	percent	73
Reduction of erosion damage		
Land treatment measures		30

January 1956

# STONY BROOK WATERSHED NEW JERSEY

Figure





# STONY BROOK WATERSHED NEW JERSEY

Figure 3

