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Stoney Creek Watershed

FINAL ENVIRONMENTAL IMPACT STATEMENT

Wayne County
North Carolina



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
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Stoney Creek Watershed
Wayne County, North Carolina

Final Environmental Impact Statement

Jesse L. Hicks
State Conservationist
Soil Conservation Service

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CATALOGING - PREP.

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January 1975

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE
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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL IMPACT STATEMENT
for
Stoney Creek Watershed
Wayne County, North Carolina

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UNITED STATES DEPARTMENT OF AGRICULTURE
ENVIRONMENTAL IMPACT STATEMENT

Stoney Creek Watershed
Wayne County, North Carolina

Prepared in Accordance with
Sec. 102 (2) (C) of Public Law 91-190

Summary Sheet

- I Draft
- II Soil Conservation Service
- III Administrative
- IV Brief Description of Action: A watershed project to be carried out by the sponsoring local organization with federal assistance under authority of Public Law 566. The project located in Wayne County, North Carolina, proposes conservation land treatment over the watershed, supplemented by three dams with multiple-purpose storage (flood prevention-recreation) and 10,840 feet of channel clearing and debris removal. This reach of Stoney Creek is a perennial stream. The channel was modified in 1932.
- V Summary of Environmental Impact and Adverse Environmental Effects: Reduce area flooded by the 100-year storm from 549 acres to 404 acres; reduce average annual acres flooded from 563 acres to 304 acres; reduce sediment yield at the mouth of Stoney Creek by an average 20,800 tons annually; reduce sediment deposition in channels; reduce runoff rates and increase infiltration on land adequately treated; reduce turbidity of stream water and improve fishery resources; reduce damage to crops and pasture by 70 percent; reduce other agricultural damages 50 percent; reduce non-agricultural damages 75 percent; provide 22,340 visitor days of recreation annually; reduce depth of flooding from the 100-year storm by 1.5 feet in the urban area; reduce flood-caused interruptions of transportation, business activities, and community life; create 24.4 man years of new employment during construction and one new job over the life of the project; provide for more efficient utilization of land and water resources; conserve land and water resources for future use; prevent increase in potentially damageable properties by flood plain zoning; develop 100 acres of upland wildlife habitat; create 219 surface acres of fish habitat; temporarily increase sedimentation during construction; restrict use of land in flood pools to activities not damaged by flooding; clear 298 acres of forestland for permanent

pools, structures, spillways, and access areas; cause relocation of one family; disrupt traffic during construction; convert approximately three miles of streams to impounded water; produce a temporary detrimental effect on the stream fishery resource in Reaches IIA and III during channel clearing and debris removal.

VI Alternatives Considered: Land treatment only; land treatment with channel clearing; land treatment and three structures; land treatment, three structures, and channel enlargement; flood proofing of fixed improvements, flood insurance with flood plain, and land treatment; purchase of land and improvements; and no project.

VII Agencies and Others From Which Written Comments Have Been Received: United States Department of Health, Education, and Welfare; United States Department of Transportation; Environmental Protection Agency; Advisory Council on Historic Preservation; North Carolina Department of Administration; North Carolina Department of Natural and Economic Resources; North Carolina Department of Cultural Resources; North Carolina Department of Human Resources; North Carolina Department of Transportation and Highway Safety; Agricultural Extension Service.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL IMPACT STATEMENT
for
Stoney Creek Watershed
Wayne County, North Carolina

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

SPONSORING LOCAL ORGANIZATIONS

Wayne Soil and Water Conservation District
Wayne County Board of Commissioners
Goldsboro Board of Aldermen

PROJECT OBJECTIVES AND PURPOSES

A preliminary investigation of the watershed area was made by the Soil Conservation Service at the request of the sponsoring local organizations. Upon completion of this investigation, the findings were discussed by the sponsoring local organizations and the Soil Conservation Service, and after the problems and potential solutions were discussed, project objectives were formulated. The sponsors set forth the primary objectives of watershed protection, flood prevention, and recreation facility development.

The local sponsors desire to establish a complete soil and water conservation program on the watershed. Some specific objectives were:

1. Increase adequate treatment for erosion control, sediment reduction, and land protection from 70 percent of the watershed to 76 percent of the watershed.
2. Attain sufficient flood reduction and protective measures to continue current land uses within the watershed.
3. Improve the recreational opportunities for the people of the watershed area.

The sponsors considered the impacts, both favorable and adverse, in developing the plan for meeting stated and other objectives. The overall project objective is the conservation, development, and productive use of the watershed's soil, water, and related resource in such a way

Project Objectives and Purposes

that the residents of the watershed can enjoy:

QUALITY IN THE NATURAL RESOURCE BASE FOR SUSTAINED USE.

QUALITY IN THE ENVIRONMENT TO PROVIDE ATTRACTIVE, CONVENIENT, AND SATISFYING PLACES TO LIVE, WORK, AND PLAY.

QUALITY IN THE STANDARD OF LIVING BASED ON COMMUNITY IMPROVEMENT AND ADEQUATE INCOME.

The sponsors selected and/or modified measures which will help to achieve these objectives and also to minimize adverse impacts wherever possible and still accomplish the project objectives.

PLANNED PROJECT^{1/}

Land Treatment

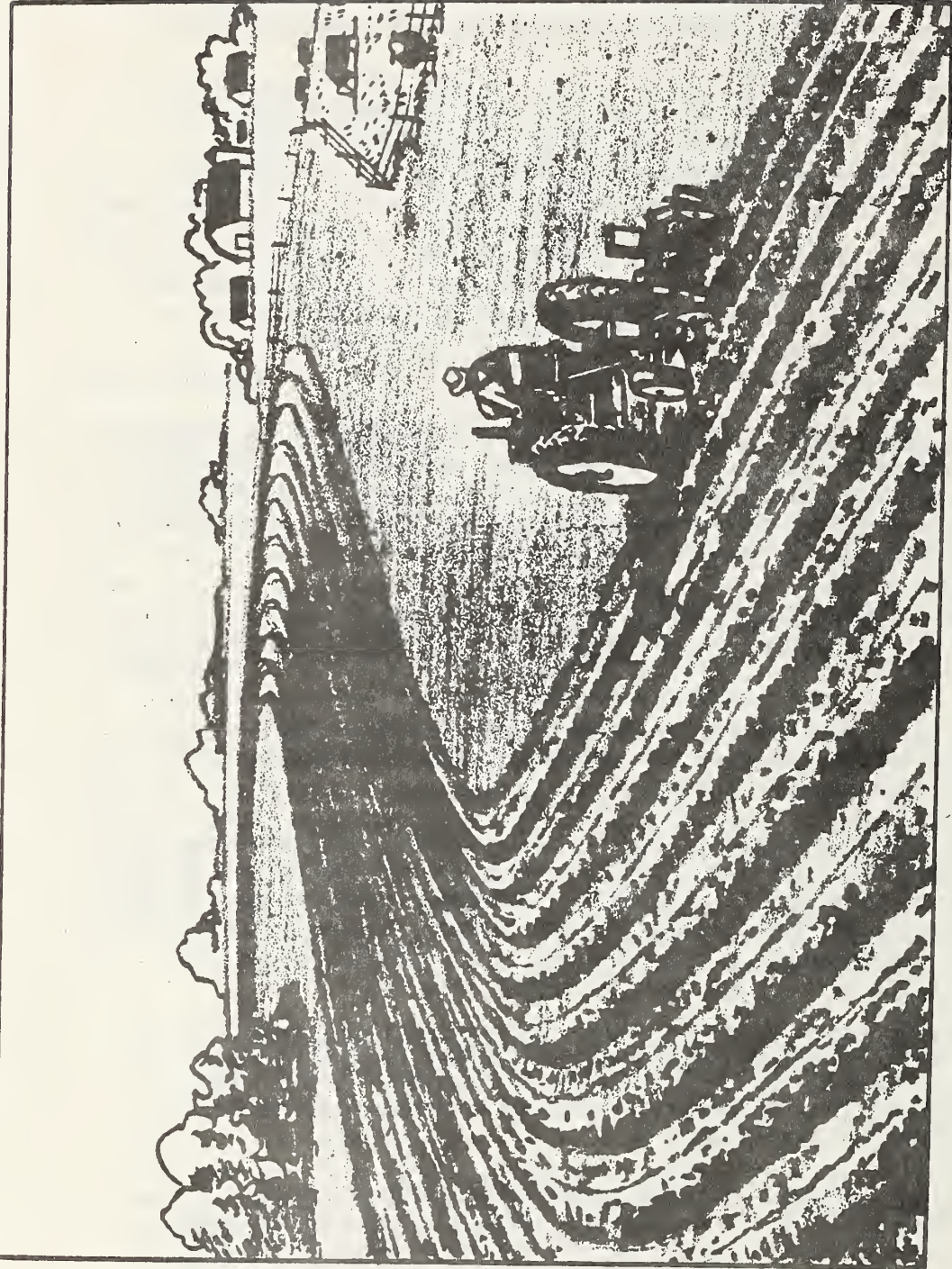
Approximately 850 acres of cropland, 100 acres of pastureland, and 110 acres of land in other uses (including 100 acres of wildlife land) will be adequately treated during the project installation period. An additional 950 acres of cropland and pastureland will receive partial treatment. Soil and water conservation plans will be prepared on 43 more farms, making a total of 108 conservations plans in the project area. Land developed within the capabilities of the soil, with the essential protective conservation practices applied, is considered to be adequately treated.^{1/}

Cropland treatment practices to be applied include approximately 1,790 acres of conservation cropping systems, 380 acres of cover crops, 1,890 acres of crop residue use, 440 acres of contour farming, 80 acres of minimum tillage (no till), and 14,000 feet of field border planting. Pastureland treatment will consist of approximately 60 acres of new seeding and 40 acres of reseeding. Treatment of land in other uses will consist of 100 acres of wildlife upland habitat development, three acres of critical area planting, and three acres of recreational area improvement. These measures and their purposes are defined as follows (2):

1. Conservation Cropping System: This system involves growing crops in combination with needed cultural and management measures. Cropping systems include rotations containing grasses and legumes as well as rotations achieving desired benefits without using such crops. This measure will improve or maintain good physical condition of the soil; protect the soil during periods when erosion usually occurs; help control weeds, insects, and diseases; and provide an economic return for farmers.

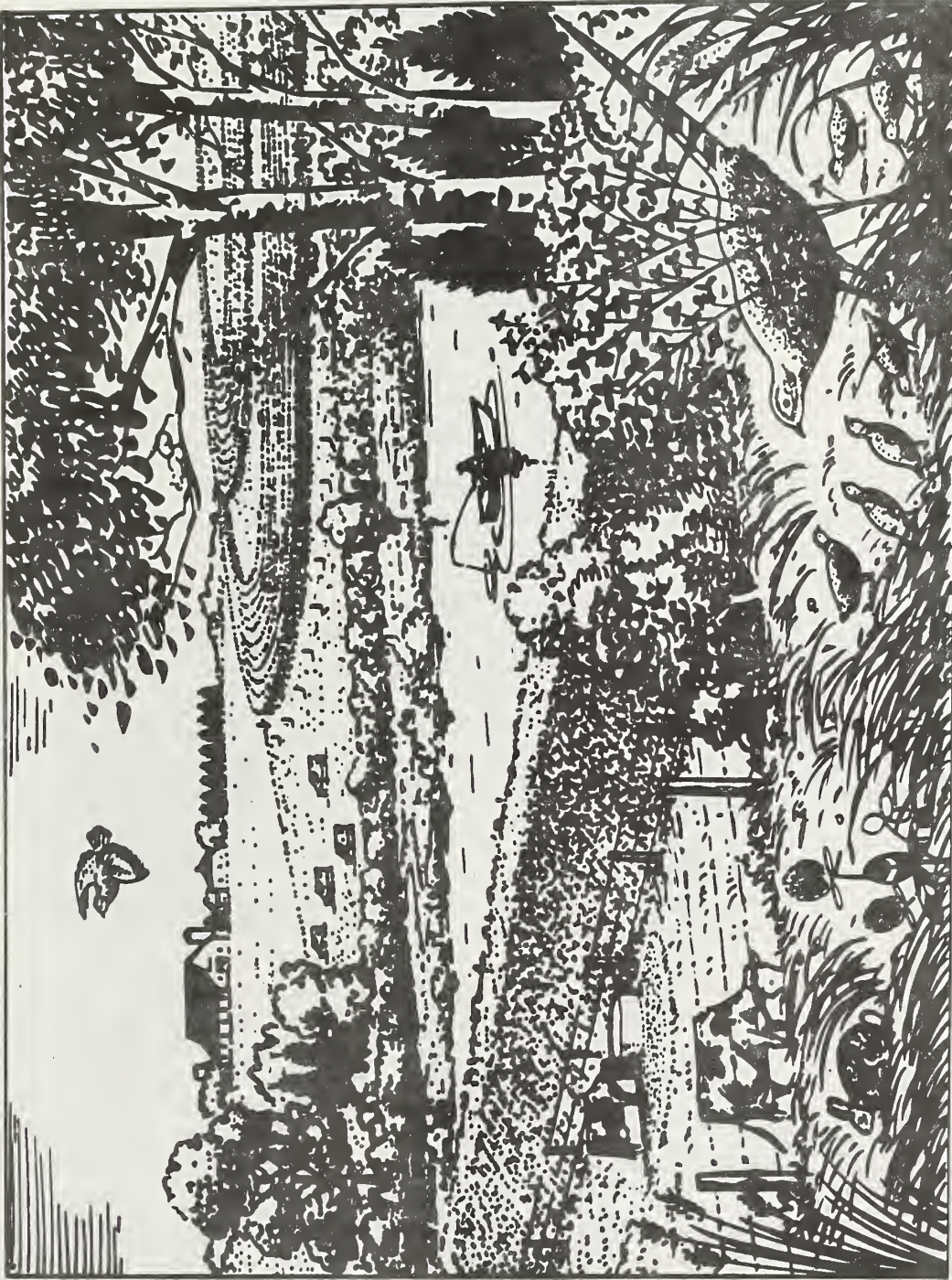
^{1/} All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigation by the Soil Conservation Service, United States Department of Agriculture.

2. Cover Crop: A crop of close-growing grasses, legumes, or small grain used primarily for seasonal protection and soil improvement, it usually is grown for one year or less except where there is permanent cover as in orchards. The purposes of a cover crop are erosion control during periods when major crops do not furnish adequate cover, addition of organic material to the soil, and improve infiltration, aeration, and tilth.
3. Crop Residue Use: By using plant residues to protect cultivated fields during critical erosion periods, this measure conserves moisture, increases infiltration, reduces soil loss, and improves soil tilth.
4. Contour Farming: Contour farming involves farming sloping cultivated land so that plowing, preparing land, planting, and cultivating are done on the contour. (This includes following established grades of terraces, diversions, or contour strips.) See Figure 1. Erosion is thus reduced and water better controlled.
5. Minimum Tillage: This measure means limiting the number of cultural operations to those that are properly timed and essential to produce a crop and prevent soil damage. These limits retard deterioration of soil structure, reduce soil compaction and formation of tillage pans to improve soil aeration, permeability, and tilth.
6. Field Border: With this method a border or strip of perennial vegetation is established at the edge of a field by planting or by conversion from trees to herbaceous vegetation or shrubs. Purposes of a field border are to control erosion, protect edges of fields that are used as "turn rows" or travel lanes for farm machinery, reduce competition from adjacent woodland, provide wildlife food and cover, and improve the landscape.
7. Pasture and Hayland Planting: Such planting means establishing and reestablishing long-term stands or adapted species of perennial, biennial, or reseeding forage plants. (Includes pasture and hayland renovation but does not include grassed waterway or outlet on cropland.) The purpose of this measure is to reduce erosion, to produce high quality forage, and to adjust land use.
8. Wildlife Upland Habitat Management: Designed for retaining, creating, or managing wildlife habitat other than wetland, this measure attempts to keep, make, or improve habitat for desired kinds of wildlife. See Figure 2.
9. Critical Area Planting: Planting vegetation such as trees, shrubs, vines, grasses, or legumes on critical areas is involved. (Does not include tree planting mainly for wood products.) The purpose of critical area planting is to stabilize the soil, reduce



Contour Farming

Figure 1



Wildlife Management

Figure 2

Planned Project

damage from sediment and runoff to downstream areas, improve wildlife habitat, and enhance natural beauty.

10. Recreation Area Improvement: Establishing grasses, legumes, vines, shrubs, trees, or other plants or selectively reducing stand density and trimming woody plants is undertaken in order to improve an area's recreational potential.

In addition to the cropland treatment measures, mechanical measures to be installed on cropland areas include 10,000 feet of diversions; 175 acres of land smoothing; 19,800 feet of terraces; 12,000 feet of open drains; and 118,000 feet of tile drains. These are defined as follows (2):

1. Diversion: A channel with a supporting ridge on the lower side constructed across the slope. The purpose of this practice is to divert water from areas where it is in excess to sites where it can be disposed of safely. See Figure 3.
2. Land Smoothing: Land irregularities are removed with special equipment. Land smoothing improves surface drainage, provides for more effective use of precipitation, obtains uniform planting depths, provides for more uniform cultivation, improves equipment operation and efficiency, improves terrace alignment, and facilitates contour cultivation.
3. Terrace: An earth embankment or a ridge and channel are constructed across the slope with suitable spacing and an acceptable grade. Terraces control erosion and reduce pollution. See Figure 4.
4. Subsurface Drain: A conduit, such as tile, pipe, or tubing, is installed beneath the ground surface to collect and/or convey drainage water. A drain may improve agricultural production by lowering the water table intercepting and preventing water movement into a wet area, relieving artesian pressures, removing surface runoff, facilitating leaching of saline and alkali soils, serving as an outlet for other drains, and providing ground water regulations and control for sub-irrigated areas.

As a part of the forestry program over the watershed, the going cooperative forestland insect and disease control programs will be continued at present levels. The going Cooperative Forest Fire Control Program will be accelerated due to the greater fire hazard generated by increasing urbanization.

Accelerated forestry technical assistance will be provided to local authorities, developers, landowners, and planning groups to insure the proper treatment of the forestland during changes from rural to urban land use. This accelerated technical assistance will include the prepa-

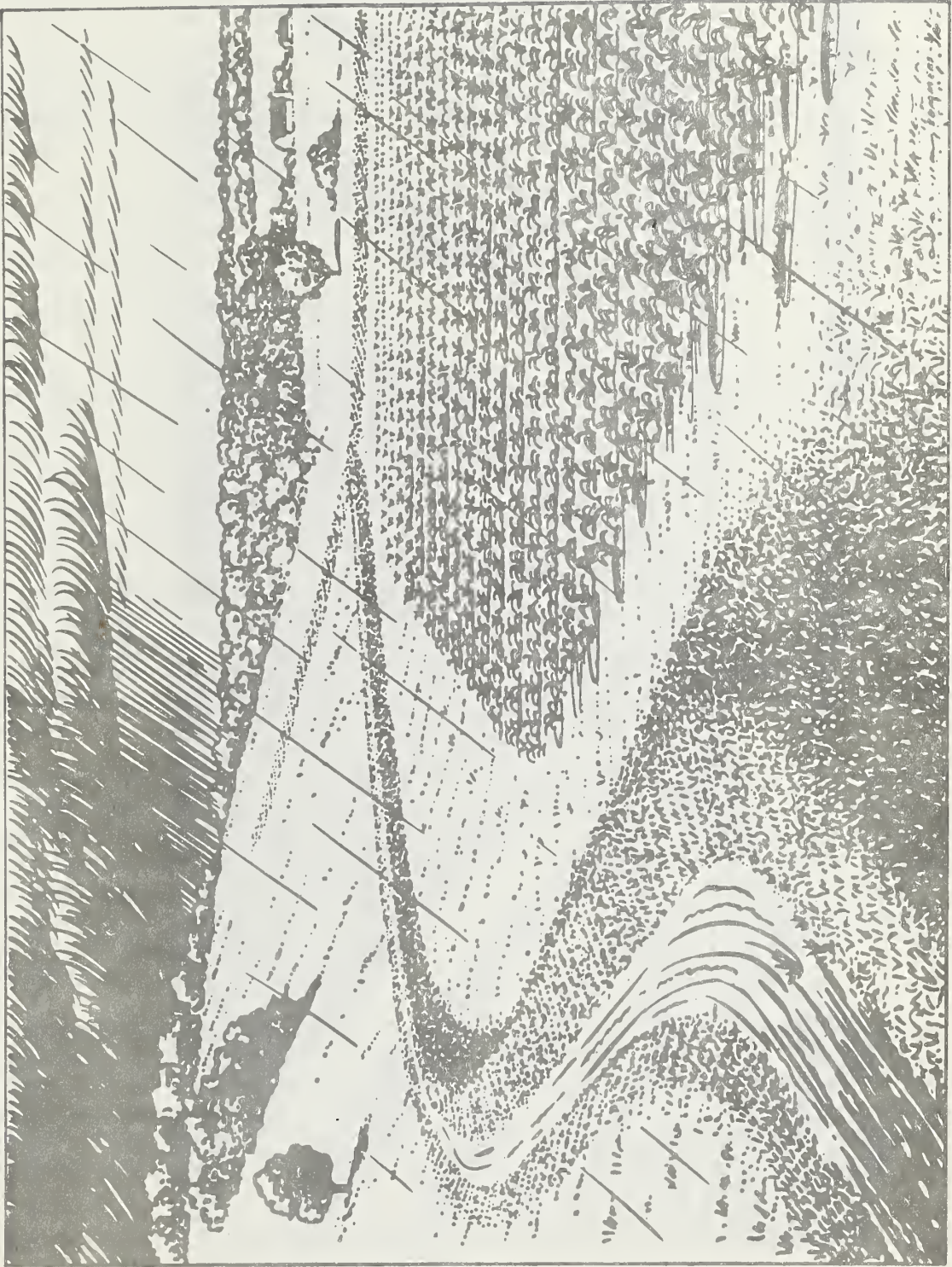


Figure 3

Diversion

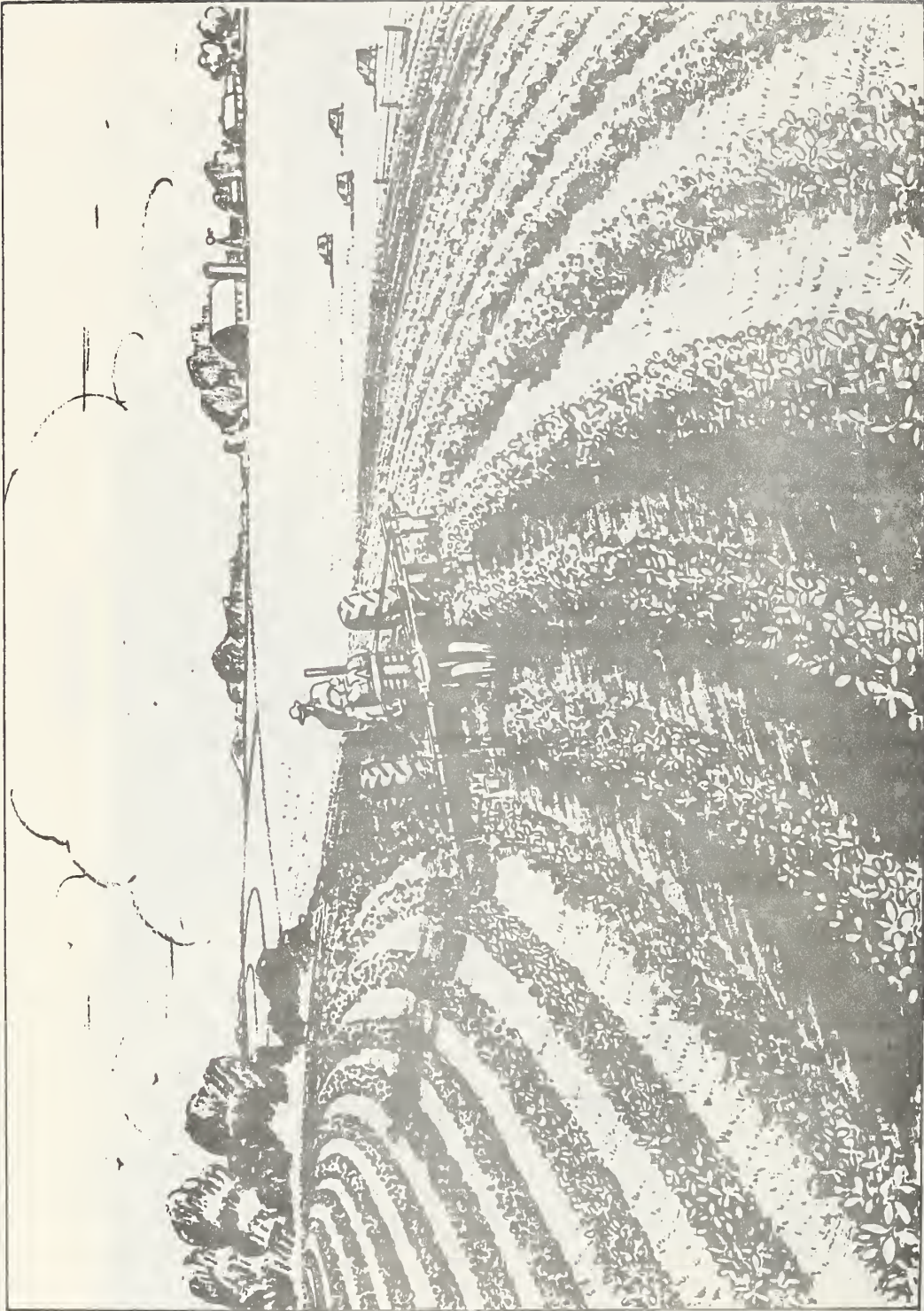


Figure 4

Terraces

Formerly Milwaukee Drawing No. CP-2

STATE COLLEGE OF WISCONSIN, 1935

4-60 4-1-14478

ration of forestland conservation reports in which needed treatment measures will be recommended. Some of the recommended measures will be the inclusion of forest buffer strips, infiltration zones, tree planting on areas to be left undeveloped and planned for forest cover, stand improvement on areas left in permanent forest cover, and the development of outdoor classrooms and recreational facilities.

Land treatment measures will be installed by landowners at their expense. Technical assistance for installation of land treatment on cropland, pastureland, and land in other uses will be provided by the Soil Conservation Service.

The North Carolina Division of Forest Resources in cooperation with the United States Forest Service will provide technical assistance to landowners and operators on forestland areas.

Structural Measures

Planned is a combination of three dams containing multiple-purpose storage and 2.1 miles of channel clearing and debris removal. The multiple-purpose dams are designed to reduce the peak flow from storm runoff in the downstream reaches, and to impound water for public recreational use. See Figure 5. The channel work is planned to increase stream velocities and thereby reduce flood stages in the urban portion of the flood plain.

The three structures planned with an effective life of 100 years will be earthfill and will control runoff from 8,295 acres or about 46 percent of the watershed. Structure No. 2 will have a drainage area of 3.53 square miles and will be approximately 25 feet in height, with a 65-acre permanent pool and a flood pool covering 142 acres at emergency spillway level.

Structure No. 3 with a drainage area of 3.76 square miles, will be about 28 feet high, and will have a permanent pool of 52 acres. Its flood pool will cover 140 acres at emergency spillway level. Structure No. 39 will have a drainage area of 5.67 square miles and will be approximately 25 feet high. The permanent pool will be 102 acres in size, and the flood pool will cover 256 acres at emergency spillway level. Approximately 25 additional acres per site will be required for spillways and dam sites.

Embankment foundations for all three structures (including principal spillways) are yielding. There is a two to four foot layer of soft, mucky silt overlaying mixed alluvial material in the flood plain areas while the abutments consist of clayey sand. A core trench and shallow relief wells will be adequate to control seepage under the embankment. Adequate fill material is available near each site. This material

Planned Project

consists of sandy clay grading into gravelly clay.

Principal spillways of the structures will consist of 30-inch diameter reinforced concrete conduits with concrete risers and excavated stilling basins as energy dissipators for the discharged water. See Figures 5 and 6. A 24-inch slide headgate will be installed at flood plain level to facilitate construction and reservoir management. An ungated orifice will be installed two feet below the crest of the riser in each of the structures. Each orifice will be sized so that it will release 0.1 cubic foot per second per square mile of drainage area with two feet of head. These orifices will assure a release from the structures equal to the 10-year, seven-day low flow.

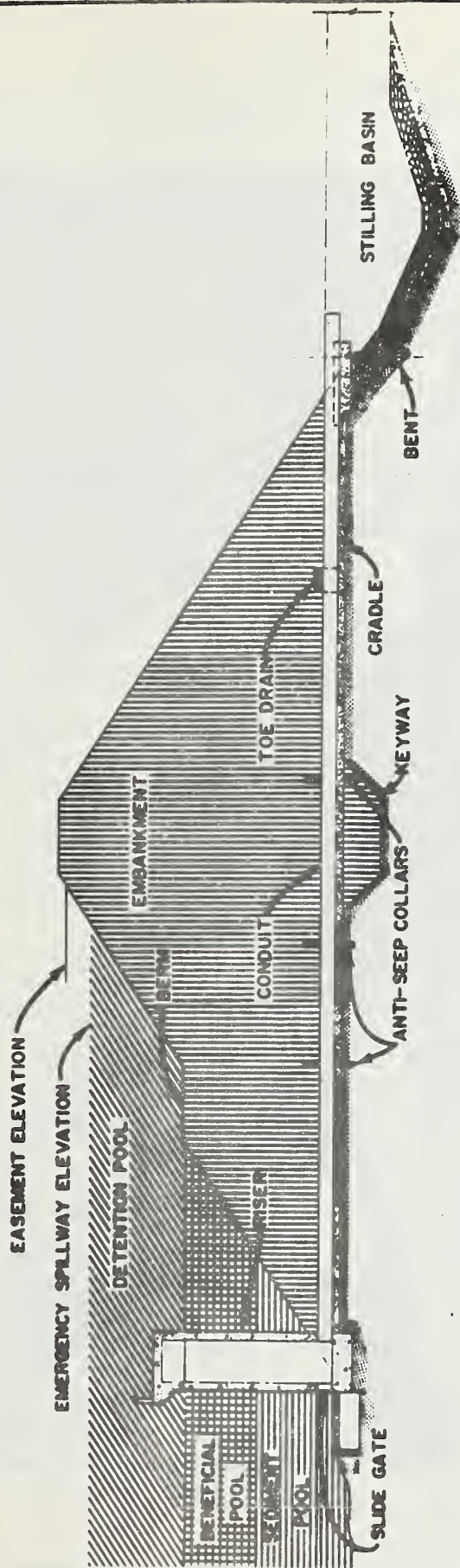
Emergency spillways of the structures will be constructed in earth and vegetated. Storage provided between the crest of the principal spillway and the emergency spillway will provide for a frequency of flow through the emergency spillway of once per 100 years on the average. Mineral material to be removed from the emergency spillway areas is suitable for fill material and will be used in the structure embankment. Additional fill material for structures will be secured from the permanent pool areas as needed.

Permanent pool areas of structures will be clear-cut of all vegetation to within one foot of ground level. All vegetation within the embankment, emergency spillway, and borrow areas will be removed by clear cutting and grubbing where needed. Vegetative material will be burned where possible, or buried.

As construction progresses, all exposed structure embankment, spillway, borrow, and other area disturbed during construction will be vegetated with adapted grasses and legumes. The prime contract will provide for vegetation, debris basins, diversions, and other similar measures to prevent sediment damage during construction.

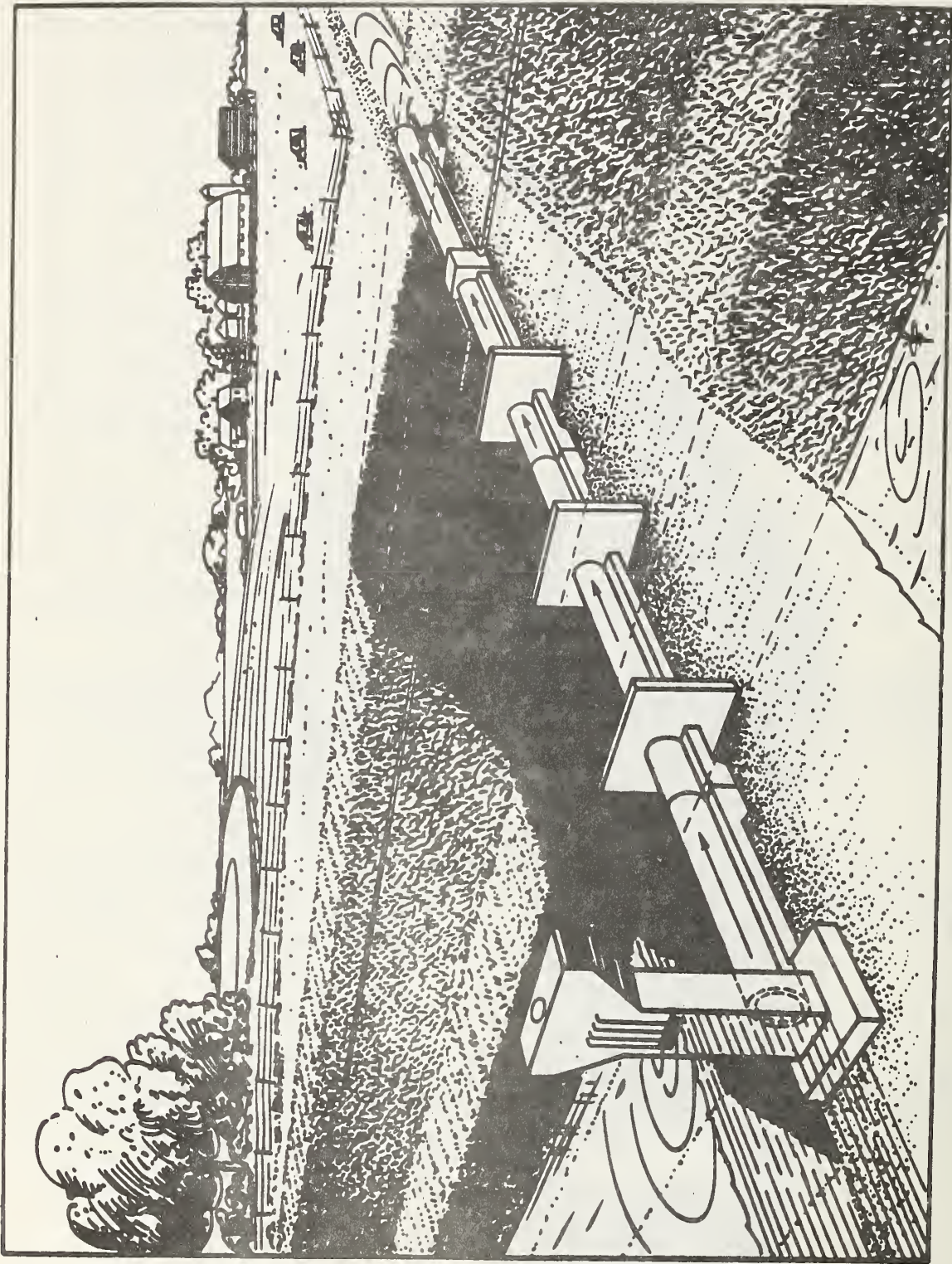
Each structure site will have a public access road, vehicle parking lot, boat launching ramp, a water supply, and sanitary facilities. See Figures 7, 8, and 9. Sanitary facilities will consist of flush toilets and septic tank with disposal field and will be installed according to North Carolina Division of Health Services regulations (3).

Structure No. 2 has two houses with basement elevations below the crest of the emergency spillway. One of these houses will be relocated. A dike will be constructed around the other house and storage sheds to prevent water damages. A dike will also be constructed around a cemetery which would otherwise be affected by the flood pool of this structure. Two roads (Secondary Roads 1523 and 1571) will be raised and a powerline modified during the construction process.



**SECTION OF A TYPICAL
MULTIPLE-PURPOSE STRUCTURE**

Figure 5



Reinforced concrete pipe with flat top inlet.

Formerly Milwaukee Chart No. 55-14
U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
PHOENIX-PC-1000 WORTH, TEX. 1000

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Figure 6

Planned Project

In connection with Structure No. 3 a house and several sheds located below the crest of the emergency spillway will be diked out. Two roads (Secondary Roads 1003 and 1571) will be raised also.

Construction of Structure No. 39 will necessitate modifying a gas line, relocating a telephone line, diking out a cemetery and a house, and raising two roads (Secondary Roads 1547 and 1523).

All modifications to existing improvements associated with a particular structure will be completed prior to initiating construction on that structure.

Structure No. 2 will require 160 acres of land rights for the impoundment area, 25 acres for the dam and emergency spillways, and two acres for the parking area and access to the lake, for a total of 187 acres. Structure No. 3 will require 156 acres for the impoundment area, 28 acres for the dam and emergency spillway, and two acres for parking area and access to the lake, for a total of 186 acres. Structure No. 39 will require 296 acres for the impoundment area, 30 acres for the dam and emergency spillways, and two acres for parking and access to the lake, for a total of 328 acres. Thus, total land rights required for the multiple-purpose structures will involve 701 acres.

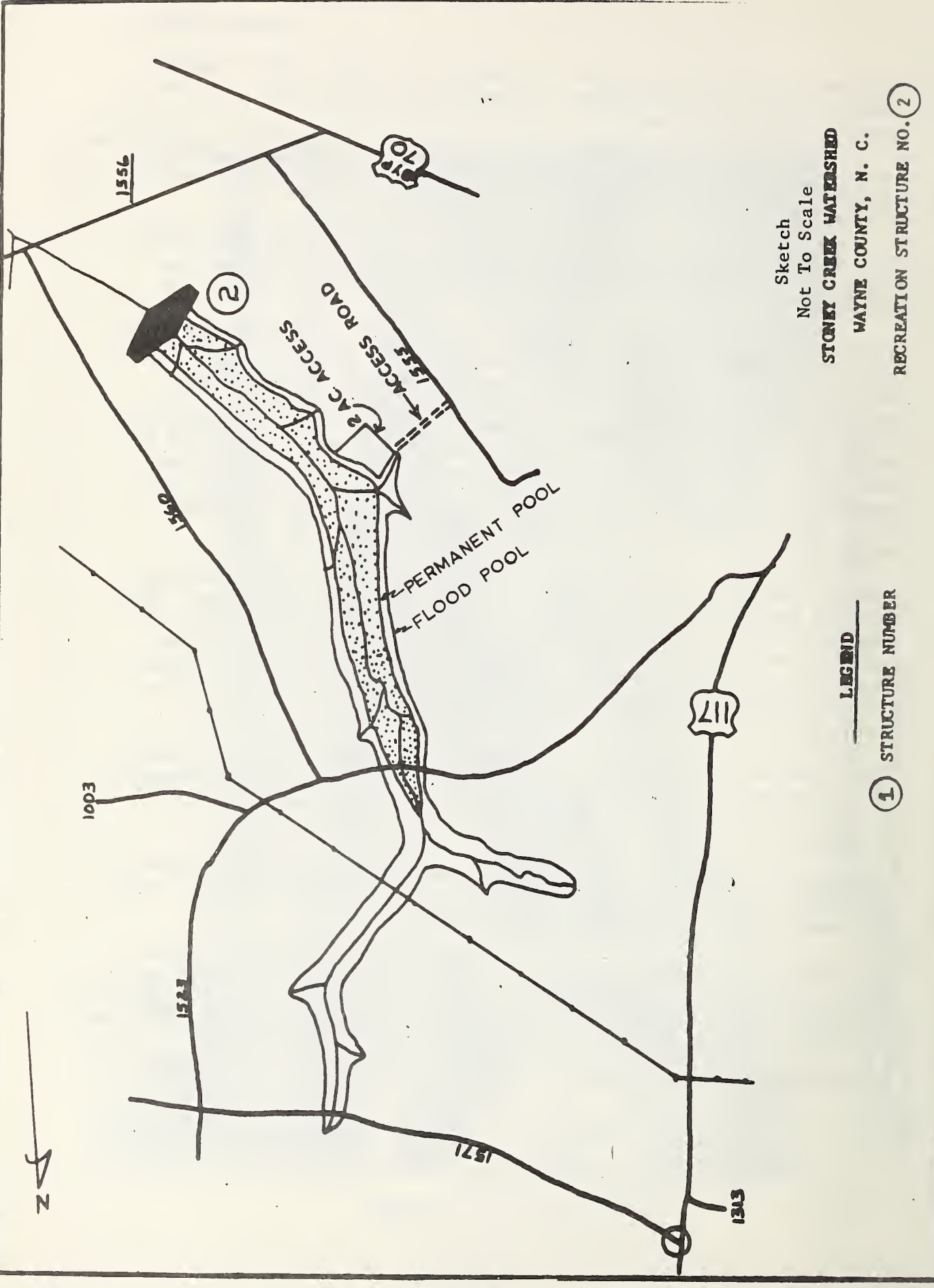
Channel clearing and debris removal is proposed for the area from the Atlantic and East Carolina Railroad to 0.6 mile below Elm Street. This work will be done on previously modified channels with perennial flow and will consist of removing channel debris, log jams, and adjacent trees which lean over the channel 30 degrees from the vertical. Material in channels consists of sandy alluvial soils. This work will be done using small, light construction equipment.

The selection of clearing and snagging as the channel design was based on the maximum increase in channel capacity possible (two-year frequency storm) within the restraint of stable channel design using tractive force analysis.

Channel work will require 13 acres of land rights, and this land will be used only as access for construction activities and as a disposal area for woody material removed from the channel.

All land rights required for each structural measure will be secured prior to letting of construction contracts. In addition to land rights for construction, permanent land rights for ingress and egress to structure sites and channels will be secured to allow proper operation and maintenance.

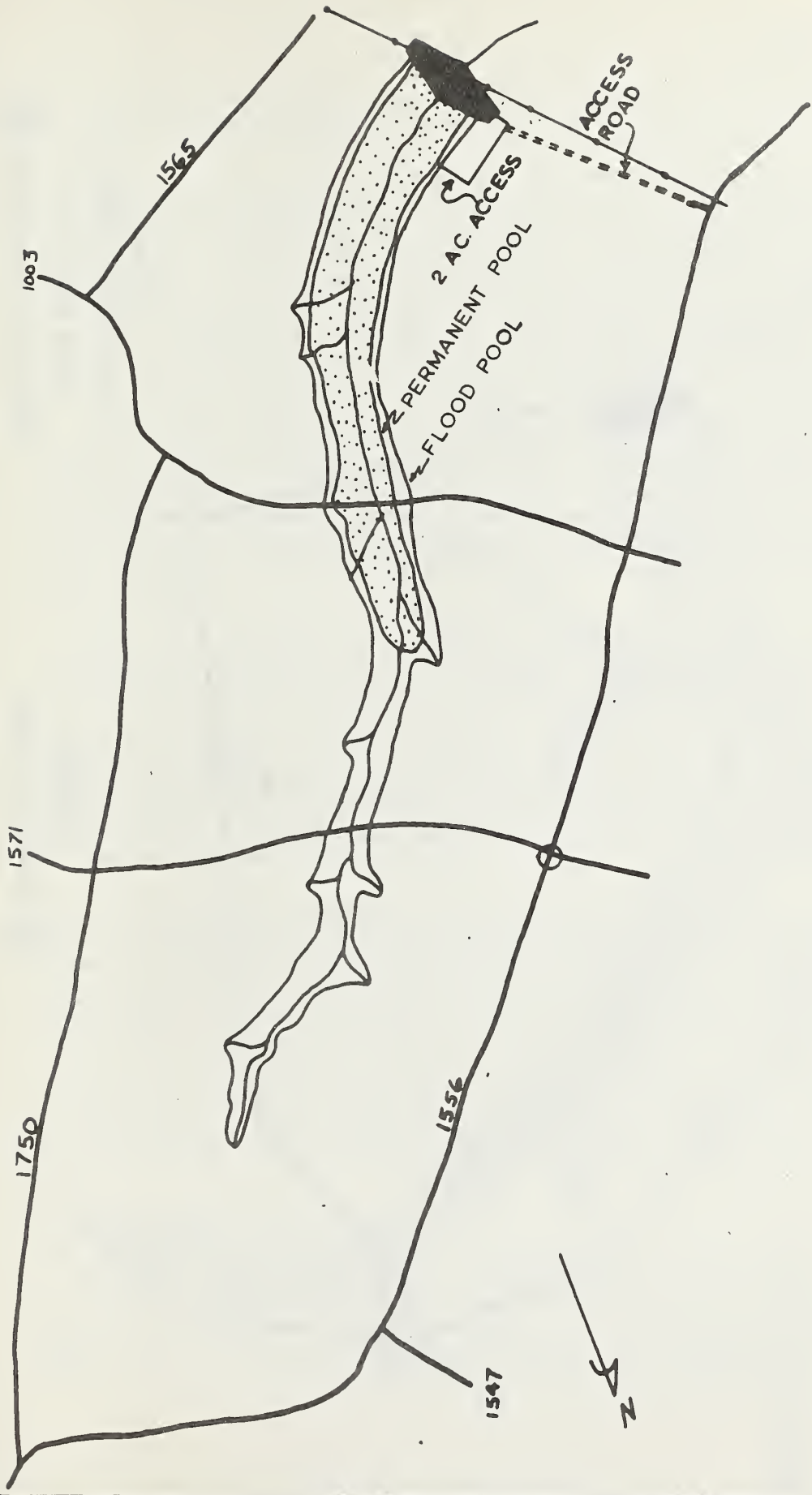
To minimize vector problems in the design, operation, and maintenance of



Sketch
 Not To Scale
STONEY CREEK WATERSHED
 WAYNE COUNTY, N. C.
 RECREATION STRUCTURE NO. 2

LEGEND
 ① STRUCTURE NUMBER

Figure 7



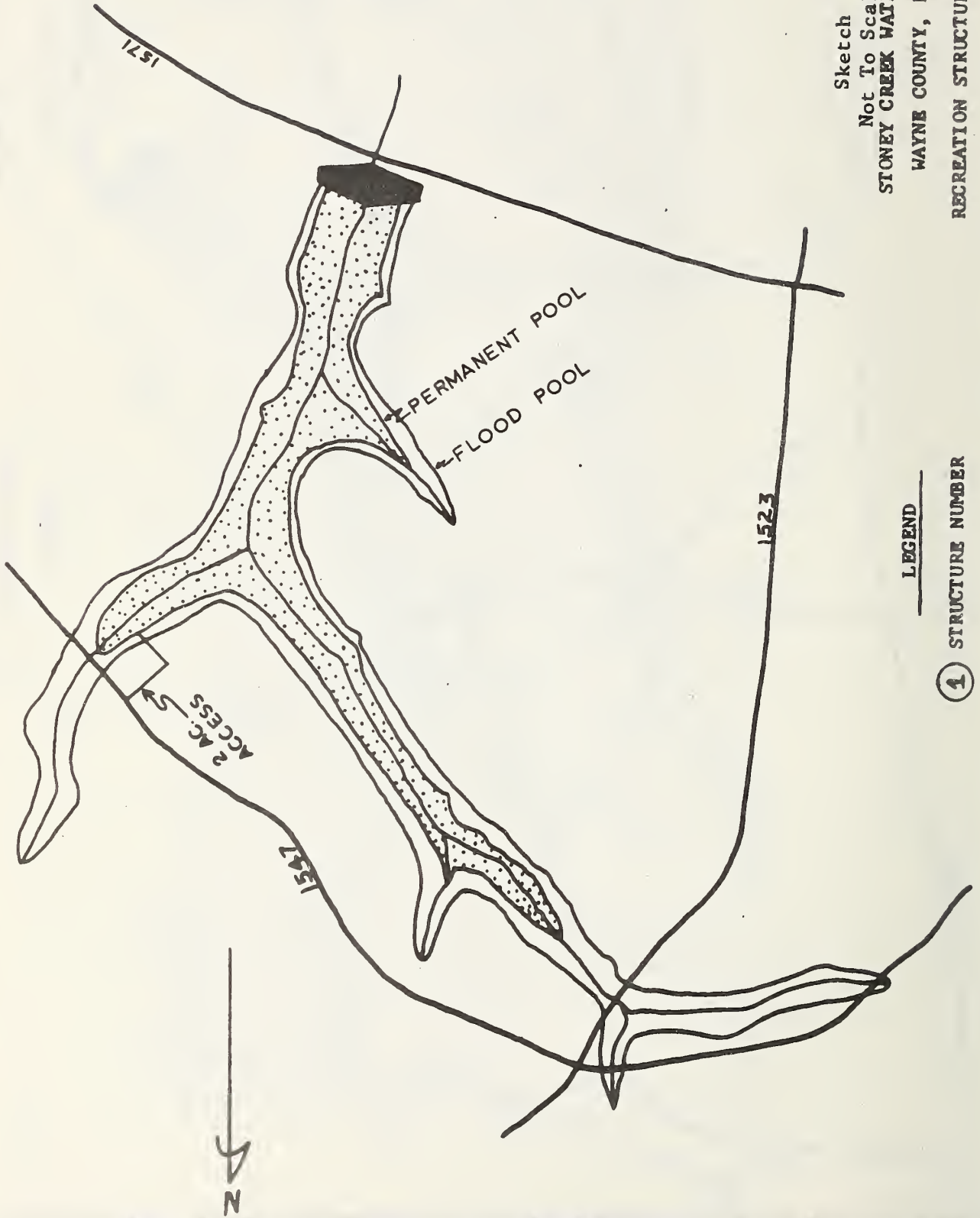
Sketch
 Not To Scale
 STONEY CREEK WATERSHED
 WAYNE COUNTY, N. C.

LEGEND

① STRUCTURE NUMBER

RECREATION STRUCTURE NO. ③

Figure 8



Sketch

Not To Scale

STONEY CREEK WATERSHED

WAYNE COUNTY, N. C.

RECREATION STRUCTURE NO. 39

LEGEND

① STRUCTURE NUMBER

Figure 9

watershed structural measures, guidelines from the North Carolina Division of Health Services will be used.

During construction, the environment will be protected from soil erosion and water and air pollution. Contractors will be required to adhere to strict guidelines set forth in each construction contract to minimize soil erosion and water and air pollution. Excavation and construction operations will be scheduled and controlled to prevent exposure of unnecessary amounts of unprotected soil to erosion forces, thus restricting the translocation of sediment. Erosion control measures will be uniquely specified at each work site and will include, as applicable, use of temporary vegetation or mulches, diversions, mechanical retardation of runoff, and traps. Motors of construction equipment will be required to have mufflers to reduce noise. Harmful dust and other pollutants inherent to the construction process will be held to a practical minimum by requiring haul roads, excavation areas, and other work sites to be sprinkled as necessary. Contract specifications will require that fuel, lubricants, and chemicals be adequately labeled and stored safely in protected areas, and disposal at work sites will be by approved methods and procedures.

Stringent requirements for safety and health in conformance with the Construction Safety Act will be included in each construction contract.

During construction, necessary sanitary facilities, including garbage disposal facilities will be located to prohibit such facilities from being sources of pollution to the live streams, wells, or springs. Conformance to all environmental control requirements will be monitored constantly by a construction inspector who will be on-site during all periods of construction operation.

The Soil Conservation Service has complied with the requirement of Public Law 86-523 that the Secretary of the Interior be notified of intent to construct planned multiple-purpose structures. The Service will advise the Secretary of the Interior through the Director, Southeast Region, National Park Service and the State Historic Preservation Office if it finds evidence, is presented with evidence, or finds during construction historical or archaeological materials. To further insure protection of possible resources of this type, the Research Laboratories of Anthropology at the University of North Carolina in Chapel Hill have been furnished a project map indicating location and extent of project measures.

Non-Structural Project Measures

Flood plain management to reduce floodwater damages and to increase recreational use of flood plain land is a concern of local project sponsors. The zoning ordinance of the city of Goldsboro was amended in August, 1971, to exclude future residential and commercial development from that portion of Stoney Creek flood plain unprotected by structural

Planned Project

measures. The area zoned extends Secondary Road 1920 (Slocumb Street) upstream to Secondary Road 1571. The flood pool areas of Structures Nos. 2 and 3 are included in the zoned area.

The city of Goldsboro will publish a map and make public announcements in the local newspapers of the remaining area subject to flooding by the 100-year frequency storm. Publication of this information will be made annually within 10 days of the anniversary of the zoning ordinance established for the Stoney Creek Watershed area.

A contract has been let with the North Carolina Department of Cultural Resources, Division of Archives and History, for a field survey to determine if there are any archaeological sites in the areas affected by structural measures. If any items of archaeological, scientific, or historical value are found during construction, the United States Department of the Interior, the North Carolina Department of Cultural Resources, and Research Laboratories of Anthropology at the University of North Carolina in Chapel Hill will be notified.

Land Use Changes

The installation of the proposed structural measures will require the following land use changes:

1. Two hundred and nineteen acres of forestland will be cleared and permanently covered by water.
2. Seventy-eight acres of forestland and five acres of cropland will be permanently committed to dams and emergency spillways. After construction, this land will have a grass cover.
3. Four acres of cropland and two acres of forestland will be used for access to the lakes. About one acre of the forestland will be cleared. Gravel parking areas will cover about one acre of land.
4. A house will be removed from the flood pool area of Structure No. 2.

Operation and Maintenance

Land treatment measures will be operated and maintained by landowners or operators under provisions of their individual soil and water conservation district plans. Maintenance will be a part of regular farm operations.

The forestry land treatment measures will be maintained by the landowners or operators under agreement with the Wayne Soil and Water Conservation

Planned Project

District. The North Carolina Division of Forest Resources, in cooperation with the United States Forest Service, will furnish the technical assistance necessary for operating and maintaining the forestry land treatment measures under the going Cooperative Forest Management Program. They will continue to furnish fire protection under the going Cooperative Forest Fire Control Program.

The district supervisors will make a periodic review of the land treatment measures installed to see that they are adequately maintained. A record of their review and action taken will be kept in the district files. The supervisors will use all means available to keep land treatment measures functioning satisfactorily.

The Wayne County Board of Commissioners will operate and maintain structural measures so that they will function as designed. Major items will include maintaining a complete vegetative cover of dams and emergency spillways, keeping water release points free of debris, replacing as required exposed metal used in dam construction, and keeping channels free of woody vegetation and debris.

In addition, operation and maintenance of public access facilities will include proper care of access roads, equipment, and sanitary supplies, and cleaning of sanitary facilities. Such operation and maintenance will be done in accord with state public health regulations.

The Service and the sponsors will make a joint inspection annually, or after unusually severe storms, for three years following installation of works of improvement. Inspection after the third year will be made annually by the sponsors and a report will be prepared by them with a copy to the Service representative.

A specific agreement for the operation and maintenance of structural works of improvement will be executed prior to signing of a project agreement. This agreement will cover such items as source of funds, methods of providing maintenance, annual maintenance inspection, and the responsibility of providing these funds and services. An operation and maintenance plan will be prepared for each structural measure.

Project Costs

Shares of the total project cost of \$1,541,579 are shown in the following table:

Project Cost Sharing

<u>Item</u>	<u>Public Law 566 Funds</u>	<u>Other Funds</u>	<u>Total Funds</u>
Land Treatment Cost	\$ 45,827	\$ 95,422	\$ 141,249
Structural Measures Cost	<u>783,860</u>	<u>616,470</u>	<u>1,400,330</u>
Total	\$829,687	\$711,892	\$1,541,579

Planned Project

Structural measures cost includes the total construction cost of \$657,000. Of this amount, \$610,155 will be paid by Public Law 566 funds and \$47,345 by other funds.

The annual operation and maintenance cost of \$12,000 is made up of the following items:

Three structures @ \$1,000	\$ 3,000
Channel	800
Recreation facilities:	
Road maintenance and equipment maintenance	1,500
Supplies and electricity	1,500
Maintenance employee	<u>5,200</u>
Total	\$12,000

ENVIRONMENTAL SETTING

Physical Resources

Stoney Creek Watershed, an area of 27.5 square miles (17,600 acres), lies entirely within Wayne County in eastern North Carolina. The watershed is located approximately 25 miles south of Wilson, North Carolina (population 29,347), 25 miles west of Kinston (population 22,309), 50 miles southeast of Raleigh (population 121,577), and 60 miles northeast of Fayetteville (population 53,510). The population of Wayne County was 85,408 in 1970, and, according to projections published by the Environmental Protection Agency, will increase to 120,000 by the year 2020. The watershed is expected to experience a higher rate of population growth than the county as a whole, since it is in the path of urban and suburban growth north and east of Goldsboro. The population of the watershed is estimated to be 75 percent urban and 25 percent rural, with about 13,400 persons residing within the city of Goldsboro (population 26,810). The 1971 population of the watershed was estimated by the North Carolina Office of State Planning to be about 32,000 which includes the approximately 8,200 residents of Seymour Johnson Air Force Base.

Stoney Creek originates about four miles northeast of Goldsboro and flows southward to its confluence with the Neuse River. The east side of the city of Goldsboro and a part of Seymour Johnson Air Force Base are in the watershed. The Neuse River Basin, together with the Tar River Basin, which adjoins it on the northeast, forms an area of about 10,000 square miles, a sub-region of the South Atlantic Gulf Water Resources Region (4). The region, as described in The Nation's Water Resources (5), includes parts of Virginia, North Carolina, Georgia, Alabama, Louisiana, and Mississippi, all of South Carolina and Florida, and has an area of 276,000 square miles which varies in terrain from rugged, wooded mountains to coastal plain flatlands. Rainfall, generally well distributed through the year, varies from over 80 inches in the mountains to 44 inches in central Georgia. In general, winters are mild and summers warm and humid. Freezing temperatures occur about 70 times

per year in the mountains and about 40 times per year in upper coastal plains.

The climate of the watershed itself is continental, as it is far enough inland to be out of reach of the tempering effects of the ocean. Weather data (6) show that temperatures vary from an average 80.5 degrees Fahrenheit in summer to an average 45.0 degrees in winter, with extremes of 108 degrees to zero degrees Fahrenheit recorded. The growing season is about 225 days, extending from about the end of March to the beginning of November. Average rainfall of about 50 inches is well distributed throughout the year with the heaviest rainfall in spring and summer and the lightest in the fall. Snowfall is too light to cause any runoff.

Geologically, the watershed is underlain by bedded sands and clays with some shell marl found in the area north of Goldsboro. The three geologic formations underlying the watershed are the Black Creek, the Tuscaloosa, and Yorktown (7). Ground water aquifers in the watershed are mainly located in these three geologic formations. The relatively thin Black Creek and Yorktown formations yield ground water of usually less than 10 gallons per minute for wells of six-inch diameter or less and are sufficient for domestic supply only. Yields from the Tuscaloosa formation are considerably higher, ranging up to 720 gallons per minute from eight-inch diameter wells.

The major user of water in the watershed is the city of Goldsboro, which secures water from Little River, which is about two miles upstream from the city. This source together with the Neuse River can meet water supply needs for the foreseeable future (7). Although the present population served by surface water supply is estimated to be 26,000, it is estimated that by 1990 38,000 persons will use these supplies. The water supply for Seymour Johnson Air Force Base comes from deep wells, and about 10,000 persons throughout the watershed secure their water supplies from ground water sources. With greater dependency on municipal systems, it is estimated that only about 3,000 will be using ground water by 1990.

Tobacco is virtually the only crop that is irrigated in the watershed and each producer has his own system, consisting of a pump, supply lines, and sprinklers. The systems are adequate, and efficiency varies from 70 to 90 percent. Water is secured from dug holes and farm ponds on individual farms. Inasmuch as tobacco is grown on sandy, well-drained soils, no problem of application is encountered.

The watershed is in the upper coastal plain, a relatively flat upland surface, incised by tributaries of the Neuse and Tar Rivers. It contains three broad land categories, based on topography, soil and drainage conditions, and usage: the flat upland plain, the valley bottoms, and the sloping valley sides.

Environmental Setting

The flat upland plain, which includes about 75 percent of the watershed area, slopes from about 130 feet mean sea level on the north end of the watershed to about 100 feet mean sea level on the terrace of the Neuse River near the southern end of the watershed.

In addition, Stoney Creek with its two main forks flows through a simple system of narrow valleys with numerous short prong-like tributaries. The valleys are typically 20 to 40 feet deep, and the creek enters the Neuse River at 68 feet mean sea level. On the upper half of the main stream and on the large tributaries, the valley bottoms are about 200 to 500 feet wide. The lower half of the main stream flows through bottomlands about 500 to 2,000 feet wide.

The sloping valley sides, comprising about 20 percent of the watershed, occur in bands about one-fourth to one-half mile wide along each side of the streams. Generally, the steepest slopes are about 10 to 15 percent, and they average five percent or less. The steepness of a slope is expressed in percent which is the vertical rise in feet per 100 feet in horizontal distance.

The main Stoney Creek is a natural, perennial stream which was modified in 1932. Average base flow is about 1.2 cubic feet per second per square mile, and sediment delivery at the mouth of the creek is estimated to be 32,430 tons per year, producing an average sediment concentration of 1,085 mg/l.

Present water quality classification of Stoney Creek and all natural streams tributary to it is "C" which means it is considered suitable for fishing and boating use. (Stream water quality classifications are established by the Water Quality Section, North Carolina Department of Natural and Economic Resources.)

According to Wilder and Slack in the Chemical Quality of Water in North Carolina (9), the water of Stoney Creek is soft, having a concentration of calcium carbonate (CaCO_3) in the range of 11 - 30 mg/l. Unpolluted fresh surface water in North Carolina is soft except for a few streams in the eastern area of the state. Nitrate (NO_3) is present in the range of 1.0 - 1.9 mg/l and chloride (Cl) in the range of 6.0 - 9.9 mg/l. Wilder and Slack note that North Carolina stream water nitrate concentrations greater than about one mg/l are probably caused by pollution from nitrogenous organic matter or fertilizer. They also note that water containing chloride in concentrations up to about 250 mg/l is acceptable for most uses.

Present overall watershed land use consists of 6,548 acres of cropland, 606 acres of pastureland, 5,110 acres of forestland, 734 acres in miscellaneous uses (mainly roads), and 4,602 acres in urban use. Land use

within the flood plain includes 10 acres of cropland, 75 acres of pasture-land, 113 acres in miscellaneous uses, and 642 acres of forestland, for a total of 840 acres. There are about 200 acres of Type I wetlands (described as seasonally flooded bottomlands in United States Fish and Wildlife Service Circular 39 (10)) found along the lower 3.2 miles of Stoney Creek.

Open agricultural land capability classification, based on the detailed soil survey of Wayne County, is as follows:

<u>Land Capability</u>	<u>Soil Series</u>	<u>Acres</u>
I	Norfolk, Wickham (0-2 percent slope)	998
IIe	Norfolk, Goldsboro, Wickham (2-6 percent slope)	2,159
IIw	Goldsboro, Lynchburg	2,050
IIs	Wagram (0-6 percent slope)	203
IIIe	Norfolk (6-10 percent slope)	305
IIIw	Rains	1,048
IIIs	Wagram-C (6-10 percent slope)	107
IVw	Johnston	<u>309</u>
	Total	7,179

The land capability classification system provides a land grouping based on agricultural use adaptations and treatment needs (11). Eight classes of land are recognized and are designated as Classes I, II, III, IV, V, VI, VII, and VIII. Classes I, II, III, and IV are suitable for rotations of crops ordinarily used in the locality. Management needs, or risks of damage, or both, are progressively greater on soils in Classes II, III, and IV. Classes V, VI, and VII are not suitable for cropland but may be protected and improved when used for pasture, hay, and forestland if certain conservation practices are applied. Class VIII is suitable for recreational or wildlife purposes only.

Land subclasses indicate the dominant limitation on use of the land. The subclasses are: (e)-erosion limitation; (w)-water limitation, either internal soil drainage or overflow; and (s)-physical or chemical soil limitation, such as sand, stones, shallow profiles, etc., which affects land use.

Formed from coastal plain sediments of sands and clays, upland soils are principally in the Norfolk, Goldsboro, Lynchburg, and Rains series. Soils in the Wickham series are found in the New River terrace, and

Environmental Setting

soils in the Johnston series are dominant in the flood plains. The soils in the Norfolk series are well-drained and have few limitations for intensive use except on the sloping areas. The Goldsboro soils are moderately well-drained and in periods of high rainfall may have a moderate degree of wetness, while Lynchburg soils, being somewhat poorly drained, and the Rains soils, being poorly drained, need artificial drainage for most uses. The Wickham soils are well-drained and have few limitations, but the Johnston soils are very poorly drained and are flooded frequently.

Plant and Animal Resources (Flora and Fauna)

Lying in the edge of the pine sub-climax of the deciduous forest region, the watershed has been greatly modified by man, and much of the natural vegetation has been replaced by cultivated and forest edge communities (12).

Wildlife habitat values within the watershed vary greatly and are influenced to a large extent by the high human population and urban development. This is particularly true of the middle reach from Secondary Road 1920 upstream to Secondary Road 1566. In the upstream reaches, wildlife habitat consists primarily of mixed hardwoods and pines interspersed with agricultural lands, while along the lower reach, approximately 200 acres of seasonally flooded bottom-land hardwoods occur. These areas are flooded primarily during winter and early spring months with the extent and duration of flooding being largely influenced by backwater flooding from the Neuse River.

Populations of upland wildlife species in the watershed are rated moderate, and wetland wildlife populations are low. Hunting pressure on upland game species is also moderate, with squirrel, quail, and rabbit the most sought after game. Hunting demands on wetland wildlife species are low.

Fishery resources in Stoney Creek are classified as poor by Bayless and Smith (13) in the Survey and Classification of the Neuse River and Tributaries, North Carolina. The lower reach, from the junction with Neuse River upstream to Secondary Road 1920, is influenced to some extent by fishery movements from the Neuse River. Redbreast sunfish and redfin pickerel are the dominant game species but fishing pressure is light. In addition to stream fishing, farm ponds provide warm-water fishing.

Economic Resources

In the watershed, public ownership of land is as follows: United States Government - 1,140 acres at Seymour Johnson Air Force Base; State of North Carolina - 25 acres at a highway maintenance headquarters; Wayne County - 100 acres at Wayne Memorial Hospital; and the city of Goldsboro - 177 acres of parks, in addition to city streets. The remaining land is in private ownership.

There are 110 farms in the watershed, most of which are family-operated, either by owner or tenant. About 80 percent of these farms are commercial, with annual sales of more than \$2,500. Tenancy on commercial farms in Wayne County declined from 52.2 percent in 1964 to 34.5 percent in 1969 (14). The average size of commercial farms increased from 95 to 106 acres with an average value of about \$75,000.

Principal farm enterprises are tobacco, corn, and soybeans, and livestock is gaining in importance and now accounts for about 25 percent of the value of all farm products sold. Average per acre yields are tobacco - 2,160 pounds; corn - 66 bushels; soybeans - 22 bushels; and pasture - five animal-unit months of grazing. The principal crops grown on soils with water limitation (capability Classes IIw, IIIw, and IVw) are pasture, soybeans, and some corn. Pasture yields in these areas average about three animal-unit months of grazing; soybeans yield about 20 bushels and corn below 50 bushels per acre.

Varying greatly throughout the watershed, land values in agricultural areas range from \$250 to \$600 per acre for upland and from \$50 to \$200 per acre for flood plain land. Urban land values also vary, ranging from \$100 to \$1,000 per acre, depending on location, improvements, management, and soil capabilities.

A well-developed network of roads provides easy access to markets, for the watershed is served by United States Highways 70, 117, and 13; North Carolina Highway 111; and numerous secondary roads. Also serving the area are the Southern Railway (Atlantic and East Carolina), and the Seaboard Coast Line Railroad.

Work force estimates, prepared by the Employment Security Commission of North Carolina (15), show that Wayne County had a civilian work force of 35,010 in 1970 with approximately 1,290 persons unemployed. The rate of unemployment declined from 6.1 percent in 1962 to 3.4 percent in 1969; then rose to 3.7 percent in 1970, and to 4.1 percent in 1971.

The following table shows the distribution of the 1970 work force:

Manufacturing (food, textiles, apparel, etc.)	6,590
Non-manufacturing (construction, trade, government, etc.)	17,870
Agricultural	4,080
Non-agricultural (non-farm, self-employed, unpaid family workers, domestics, etc.)	<u>5,180</u>
Total employed	33,720
Unemployed	<u>1,290</u>
Total work force	35,010

Environmental Setting

Technological advances in farming have released many farm workers into the labor market, and agricultural employment in Wayne County declined from 6,630 in 1962 to 4,080 in 1970. Many of these workers migrated to other areas, with out-migration from Wayne County estimated by the Office of State Planning, North Carolina Department of Administration, at 9,85 percent during the 1960's. Net out-migration for the decade was thus about 9,330 persons.

Goldsboro, the trade center for a large farming area, is an important tobacco market, with sales of more than 11 million pounds in the 1970-71 season (16). Agriculture is an important basic industry in the watershed area, and workers directly employed in agriculture account for about 12 percent of employment in Wayne County with agricultural product sales amounting to \$29,941,000 in 1969 (14). Agriculture is expected to remain the major economic activity in the upper half of the watershed.

Urban development in the Goldsboro area is expected to take place to the north and east of the city. Therefore, according to the Stoney Creek Watershed Land Potential Study (7), most of the watershed south of Secondary Road 1003 will be urbanized.

Recreational Resources

As noted in the Stoney Creek Watershed Land Potential Study (7), nearly all recreational activities within the watershed area are found in the city of Goldsboro. Exceptions are the light stream and pond fishing and the moderate hunting activities in the rural parts of the watershed.

Of the four public parks in the watershed, Quail Park and Stoney Creek Park are located along Stoney Creek, and Fairview Park is adjacent to the Fairview Homes housing project near Stoney Creek. All are within the city of Goldsboro. Berkley Memorial Park is just east of the city in the vicinity of Adamsville. The area of each park and its annual attendance, estimated by the Division of Parks and Recreation of the North Carolina Department of Natural and Economic Resources, are shown in the following table (17):

<u>Facility</u>	<u>Area</u>	<u>Attendance</u>
Fairview Park	18 acres	38,000
Quail Park	9 acres	---
Berkley Memorial Park	29 acres	188,000
Stoney Creek Park	<u>4 acres</u>	<u>12,000</u>
Total	60 acres	238,000

Providing a variety of recreational opportunities, these parks have facilities such as softball fields, picnic shelters, grassed play areas, playground apparatus, horseshoe pits, a wading pool, and flower beds.

A number of opportunities for recreation on the water exist outside the watershed itself but in the immediate vicinity. Sediment pools of six floodwater retarding structures for the Bear Creek Watershed, for example, are located from two to five miles east of the Stoney Creek area, and these impoundments provide fishing facilities. The Carolina Power and Light Company's Quaker Neck Lake, primarily used for power plant cooling, also provides bank fishing and picnicking and is located about six miles west of the watershed. In addition, there are three commercially operated fishing lakes open to the public listed in the sites inventory of the Division of Parks and Recreation. One of the lakes is located ten miles to the south, another ten miles northeast, and the third is five miles west of the watershed. These lakes have a combined surface area of about 60 acres, and total annual attendance is estimated at 7,000.

Still another recreational area is the Little River, with its Goldsboro access area owned and operated by the North Carolina Wildlife Resources Commission. West of Goldsboro and about five miles from the watershed, this facility hosts about 500 visitors a year, according to the Division of Parks and Recreation. Swimming is the chief use of the 11-acre lake at the Cliffs of the Neuse State Park, about 10 miles south of the watershed. Fishing and boating use here is estimated at 5,000 persons per year.

The Soil Conservation Service, in cooperation with other agencies, has compiled An Appraisal of Potentials for Outdoor Recreational Development in Wayne County, North Carolina (18). The results are summarized as follows:

Vacation Cabins, Cottages, and Homesites have a high potential.

Camping Grounds - Vacation site camping grounds, pack trip camping, and transient camping grounds all have a medium potential for future development.

Picnic and Field Sports Areas have a high potential.

Fishing Waters have a high potential.

Golf Courses - Standard and Par-3 golfing have a medium potential, while driving ranges and miniature golfing have a high potential.

Hunting Areas have a high potential.

Environmental Setting

Scenic and Historic Areas have a medium potential.

Riding Stables have a medium potential.

Shooting Preserves have a medium potential.

Vacation Farms have a medium potential.

Water Sports Areas have a medium potential.

Archaeological and Historic Resources

Contact with the North Carolina Department of Cultural Resources, Division of Archives and History, and the Research Laboratories of Anthropology at the University of North Carolina in Chapel Hill, did not reveal any places of historical or archaeological value located within the watershed area. The National Register of Historic Places lists the Charles B. Aycock Home, a state historic site, located approximately five miles north of the watershed. An Appraisal of Potentials for Outdoor Recreational Opportunity in Wayne County, North Carolina, lists a Tuscarora Indian site, destroyed in 1712, located four miles northeast of the watershed. Several late 18th century to mid 19th century homes within Goldsboro are also listed.

Soil, Water, and Plant Management Status

Land use trends in the watershed primarily reflect the conversion of cropland and forestland to urban and suburban uses. Urban, suburban, and road uses now occupy 5,306 acres and are expected to occupy about 6,630 acres within the next 10 years.

Forty-five percent of the watershed farms, involving 66 percent (8,133 acres) of the agricultural land in the watershed, are covered by cooperative agreements with the local soil and water conservation district. Complete conservation plans have been developed on 33 percent of the watershed farms. Such plans cover 51 percent (6,265 acres) of the existing agricultural land in the watershed. Approximately 26 percent of the planned land treatment measures have been installed, with 70 percent of the watershed area adequately treated. A detailed soil survey of Wayne County has been completed and was published in June, 1974.

Through the various federal-state cooperative forestry programs, the Division of Forest Resources is providing forestry management assistance, forest fire prevention and suppression, distribution of planting stock, and forest pest control assistance to private landowners in the watershed.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

Sheet erosion, mostly caused by straight-row farming without proper conservation methods, is a severe problem on 1,600 acres of cropland in soil capability classes IIe and IIIe. However, the problem is difficult to resolve because this well-drained land is adapted for tobacco and other high-income producing crops.

Since application of land treatment measures must be voluntarily paid for by the owner, problems are encountered. For example, adequate land treatment measures may not yield a profit in the short run, and, therefore, may not be attractive to the landowner. The practice of renting cropland also creates a problem since the renter frequently does not have an interest in applying conservation measures. Further, in areas where farmland is being converted to urban uses, there may be no incentive for the landowner to adequately treat land which might soon go out of agricultural production. In addition, the use of large farm machinery in small fields makes contour farming and other conservation practices costly because more turning time and area are needed. It also is often difficult to secure equipment necessary for installing conservation measures such as grassed waterways and land smoothing. Lack of personnel for adequate conservation planning and follow-up also presents a problem.

As the urbanization of once predominantly rural land continues, problems such as increased peak runoff rates from areas converted from farm and pastureland to shopping centers, schools, streets, and buildings also multiply. The increases in volume and peak rate of runoff cause the water to become a misplaced resource. Of all land use changes affecting the hydrology of an area, urbanization is by far the most forceful.

Another such problem arises when building sites are denuded for construction, causing a very large sediment movement in a stream channel immediately downhill from the construction site. During storm flow, the sediment movement is great, and as urbanization continues, construction activities increase the potential of sediment loads.

There are also water management problems in the use of about 2,970 acres of cropland and 410 acres of pastureland in land capability classes IIw, IIIw, and IVw. Excess rainfall has to be removed, and wet soils need drainage for efficient agricultural use. Urbanization, commercial development, and roads add to the problem by making drainage more difficult.

Resource Problems

Floodwater Damages

Floodwater damages were evaluated on 549 acres of the 840 acres of flood plain land subject to flooding by the 100-year frequency storm. About 47 percent of this land floods annually and about one-third floods twice annually. Most of the floods occur during seasons when crops and pasture are susceptible to the greatest damages. The storm of October, 1964, rated between the five-year and ten-year frequency, caused estimated damages of \$92,750, for example.

There are two areas along the stream course where development has encroached upon the flood plain. In the vicinity of Wayne Memorial Hospital, a house and lot and several lots downstream of United States Highway 70 By-pass receive damages from floodwaters. Some development also has occurred in the area from Royal Avenue downstream to Elm Street. There now are 14 houses, five apartment units, three commercial or business establishments, a park and associated facilities, and three college buildings within the 100-year flood plain, and these receive floodwater damages. (See Appendix C.) Heating systems, furniture and other house furnishings, floors and foundations of buildings, and automobiles are examples of damaged property. In addition, business and college activities are disrupted during floods, and cleaning up costs are incurred. Non-agricultural damages result from flooding of properties now valued at over \$1,069,000.

The flooding problem and swamping have limited land use in the agricultural reaches and to a greater degree in the developed reaches. Swamping is defined (20) as any impairment of drainage of bottom lands or colluvial soils by sediment deposits. It may be caused by the filling of stream channels with the products of accelerated erosion, thus raising the water table on the bottom lands, or by formation of natural levees from recent sediment deposits which prevent proper surface drainage. Swamping and the risk of crop losses from flooding have caused most farmers to move row crops from the flood plain to the uplands. Associated with this land use shift have been accelerated sediment damages due to the increase in use of type "e" land for row crops.

Flooding directly affects the health and lives of people in the watershed and especially of those in the flood problem area. For example, greatly increased mosquito populations and stream pollution result from every major storm. Organic matter and trash also are deposited by floodwater on public grounds and lawns, creating a health hazard, reducing aesthetic values, and causing environmental degradation.

TABLE NO. I

Acres Flooded by Various Storms for Present Conditions

Reach	ACRES FLOODED		
	Present Conditions		
	Storm		
	<u>100</u>	<u>10</u>	<u>1</u>
I	63	48	41
IA	38	22	0
II	156	99	42
IIA	45	33	28
III	183	162	100
IV	13	13	9
V	<u>51</u>	<u>45</u>	<u>38</u>
Total	549	422	258

Furthermore, land values in the flood plain are somewhat depressed because of the flood hazard and are inversely related to frequency of flooding; but, as agricultural lands are converted to non-agricultural uses, land values are expected to gradually increase despite the existing flood hazard.

Floodwater damages to crops and pasture are estimated to be \$745 annually. Other agricultural damages are about \$1,845 with non-agricultural damages about \$69,180. Average annual floodwater damages thus amount to approximately \$71,770.

Erosion Damages

Accelerated sheet erosion on about 1,600 acres of well-drained cropland adjacent to the flood plain and drainageways is one of the major conservation problems in the watershed. Soil loss from this land is estimated to be in the range of 25 to 30 tons per acre per year, while the average annual rate for the total watershed area is 6.1 tons per acre and is the primary source of sediment. Further erosion will reduce the capability of this land for agricultural production and could result in its less intensive use as pastureland or forestland.

Average erosion rates by land use are shown in the following table:

Resource Problems

TABLE NO. II

Present Average Annual Gross Erosion
(Before Project Land Treatment Applied)

Land Use	Acres	Erosion Rate Tons/Acre/Year	Tons
Cropland	6,548	12.3	80,540
Adequately Treated	1,684	3.4	5,726
Partially Treated	4,864	15.3	74,814
Pastureland	606	1.2	727
Forestland	5,110	0.8	4,088
Miscellaneous (includes road banks)	734	2.6	1,908
Urban Areas	4,602	4.5	20,847
Established	4,372	0.9	3,935
Under Construction	230	73.5	16,912
Total	17,600	6.1	108,110 ^{1/}

^{1/} Approximately 32, 430 tons are delivered to the mouth of the watershed.

Sediment Damages

An estimated 32,430 tons of the 108,110 tons of annual erosion are delivered as sediment into the Neuse River from the watershed each year, resulting in an average sediment concentration of 1,085 mg/l. Much of this sediment is ultimately deposited in the Neuse River estuary, causing the impairment of navigation, recreation, water supply, and fish propagation functions (21) (22). Sediment damages to the river and estuary are estimated at \$19,200 annually.

The filling of channels with sediment and the natural channel leveeing resulting from overbank flooding have created swampy conditions in the flood plain along Stoney Creek and the main tributaries. In the agricultural reaches (I, IA, II, IIA, and V), swamping prevents the use of land for crop cultivation. Twenty-six acres in Reach I, 15 acres in Reach IA, 47 acres in Reach II, 14 acres in Reach IIA, and 18 acres in Reach V are swamped, with annual damages estimated at \$5,730.

Drainage Problems

About 2,970 acres of cropland require some form of drainage for optimum production. Most of this area is in the headwaters where the land is flat and a drainage system has never completely developed.

Resource Problems

Farmers have installed tile field drains and open ditches on about 700 acres of the wet cropland. However, not all of the systems are complete or efficient, and additional drainage measures are needed. The drainage is now sufficient so that most water-tolerant crops can be produced with reasonable success. Yet tobacco is an exception, and the best drained land must be used for this crop. The need to rotate tobacco and other crops creates the demand for improved drainage of cropland, but high cost of such measures has prevented their installation on all wet cropland.

Recreation Problems

Population growth, rising standards of living, and increased leisure time are creating increased demand for outdoor water-based recreation in the watershed and surrounding area. Most of the population of Wayne County lives within ten miles of the watershed.

The North Carolina Division of Parks and Recreation has estimated unmet recreation needs in Wayne County as: 160 acres of Class I sites, 2,324 acres of Class II sites, and 24,927 acres of Class III sites. Class I sites are intensively developed for group sports and are usually within or near major urban populations. Class II sites are general outdoor recreation areas, generally more remote than Class I areas, featuring activities such as camping, nature walks, and outdoor sports. Class III sites are natural environment areas which support weekend and vacation activities dependent on a natural setting such as nature study, sightseeing, hunting, and fishing.

The 160 acres of unmet needs for Class I sites are composed of 21 acres of neighborhood emphasis areas, seven acres of community emphasis areas, and 132 acres of city parks. Most of the unmet needs are in Goldsboro.

Water-based recreation within the watershed, aside from fishing in farm ponds, is limited to bank fishing in pools mainly in the lower part of Stoney Creek where accessibility is good. There is only one lake of 1,000 acres or more within 50 miles of the watershed and only 280 surface-acres of lake water within Wayne County available for public use (23).

Plant and Animal Resource Problems

A basic problem relating to fish and wildlife resources within this watershed arises from continuing urban and suburban development, and it is estimated that approximately 1,300 acres will be converted to urban uses within the next ten years. However, the city of Goldsboro is a bird sanctuary and the less densely populated residential areas within the city provide refuge for upland game species, such as squirrel, as well as for song birds. In the reach downstream from Secondary Road 1556, urbanization of existing wildlife habitat is occurring at a rapid pace. Sedimentation from both agricultural land and construction sites has restricted the aquatic life in the watershed streams.

Other problems associated with forestland plant and animal management are fire control and forest pest control.

Water Quality Problems

The major water quality problem in Stoney Creek is sediment, for as noted by Bayless and Smith (13), the water of Stoney Creek is frequently turbid. This turbidity, especially toward the lower end of the watershed,

Resource Problems

restricts the recreational value of the water. The present stream classification is "C," designating suitability for fishing and boating use. The stream classification was upgraded from "D" to "C" by the North Carolina Environmental Commission on August 22, 1974.

Economic-Social Problems

Although significant gains have been made, per capita income in the watershed area lags behind that of the state and nation. The per capita income of the county was \$3,066 in 1970; while those of the state and nation were \$3,208 and \$3,910, respectively. In 1969, 22.2 percent of the families in Wayne County had incomes of less than the poverty level defined in the 1970 Census of Population. Nevertheless, it is likely that average incomes in the watershed area are above those of the county because of the large urban and suburban population in the Stoney Creek vicinity.

Mean family income in the state, according to the 1970 census, was \$8,872, while that of Wayne County was \$7,387. Half of all families then had incomes of less than \$6,354, the median family income, compared to the state median family income of \$7,774. Thus, there is a need to increase income and employment opportunities in the watershed area.

About 25 percent of the farms in Wayne County had sales of less than \$5,000, according to the 1969 Census of Agriculture (14). (This does not include part-time and part-retirement farms.) The average net income of all farms in the county was \$3,900 in 1969, and the average net income of commercial farms was \$5,000, according to census data.

The need for vocational training and retraining is evidenced by the number of persons who have left agricultural employment over the past decade, and by the increase in nonagricultural employment from 15,590 in 1962 to 24,460 in 1970 (15).

ENVIRONMENTAL IMPACTS

Conservation Land Treatment

Land treatment will reduce the present average annual watershed gross erosion rate of 6.1 tons per acre to 4.2 tons per acre. Land treatment without the planned floodwater retarding structures would also reduce the present average annual sediment yield at the mouth of the watershed from 32,430 tons to 22,300 tons (see Table III). Land treatment measures will provide flood damage reduction benefits of approximately \$2,340 annually.

TABLE NO. III
 Future Average Annual Gross Erosion
 (After Project Land Treatment Applied)

Land Use	Acres	Erosion Rate :Tons/Acre/Year :	Tons
Cropland	6,548	7.2	47,453
Adequately Treated			
Before Project	1,684	3.4	5,726
During Project	848	2.9	2,459
After Project	532	3.2	8,185
Partially Treated			
After Project	4,016	7.7	31,083
Pastureland	606	0.9	545
Forestland	5,110	0.7	3,577
Miscellaneous (includes road banks)	734	2.6	1,908
Urban Areas	4,602	4.5	20,847
Established	4,372	0.9	3,935
Under Construction	230	73.5	16,912
Total	17,600	4.2	74,330^{1/}

1/ Approximately 22,300 tons will be delivered to the mouth of the watershed.

The reduction of sediment deposition in the channels will help relieve the aggrading situation (past and present) which is the main cause of the swamping problems throughout the flood plain areas. Swamping problems and risk of crop losses from flooding in the agricultural reaches have caused most farmers to move row crops from the flood plain to the uplands, further aggravating erosion and sedimentation problems.

The quality of stream water in the watershed will be improved by a reduction in turbidity. The average sediment concentration in water leaving the watershed would be reduced from an estimated 1,085 mg/l to 745 mg/l by land treatment or to 390 mg/l by land treatment and structural measures combined.

By reducing erosion and producing more vigorous growth, conservation land treatment will contribute to the aesthetic appeal of agricultural land and also aid long-term agricultural productivity.

Since land treatment measures reduce runoff rates and increase infiltration volumes, ground water resources in the watershed will not be harmed and, most likely, will benefit due to the increased infiltration rates.

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Structural Measures

Installation of the three multiple-purpose structures will provide a further reduction in the amount of sediment delivered to the mouth of the watershed of 10,670 tons per year. This, together with the 10,130-ton reduction from land treatment, will result in 11,630 tons of sediment being delivered annually under future conditions with project, a 64 percent reduction.

The planned project will reduce the area damaged by the 100-year frequency flood from 549 to 404 acres. In the urban part of the watershed (Reach IIA and Reach III), the area flooded by this storm will be reduced from 228 acres to 189 acres, and the depth of flooding will be reduced an average of 1.5 feet. Damages from a recurrence of the October, 1964, flood would be reduced from \$92,750 to \$26,500, a reduction of about 70 percent; while the area flooded would be reduced by approximately 25 percent. Table IV illustrates the reduction in area flooded in each evaluation reach by the 100-year, 10-year, and annual storms. See Appendix A.

TABLE NO. IV
Acres Flooded by Various Storms for
Present Conditions and Future Conditions with Project

Evaluation Reach	ACRES FLOODED					
	Present Conditions			Future Conditions		
	100	10	1	100	10	1
I	63	48	41	50	45	33
IA	38	22	0	20	10	0
II	156	99	42	95	57	31
IIA	45	33	28	33	30	21
III	183	162	100	155	122	50
IV	13	13	9	12	10	0
V	51	45	38	39	36	7
Total	549	422	258	404	310	142

There are 14 homes, five apartment units, three commercial or business establishments, a park, and associated facilities, and three college buildings that would benefit from reduced flooding. However, after the project is installed, floodwater from the 100-year frequency storm still will reach to or above the flood level of six residences, a college building, a scout hut, a park shelter, and above the greens of a putt-putt golf course.

Nineteen families who live in the area flooded by the 100-year frequency storm will benefit from reduction in flood hazards. The community and surrounding area also will benefit from reduced interruptions to transportation, business activity, and normal community life. In addition, floodwater damages to crops and pasture will be reduced by 70 percent, and damages to fences and farm buildings will be reduced 50 percent. About 75 acres of pastureland and 10 acres of cropland also will be protected and become available for production. The reduction to non-agricultural damages will amount to approximately 75 percent.

Furthermore, installation of structural measures will allow about 100 acres of land along the fringes of the flood plain to be developed for business, industrial, and residential uses. The first area where this is expected lies along Reach III where development is already occurring, and the other is at the upper end of Reach IV in the vicinity of the county hospital. As a result of the project, about 100 acres will be developed, probably for urban use. Increased sediment during construction will result.

A wet forestland area of 219 acres will be converted permanently to water for the three floodwater retarding structures. This water, suitable for fish, will provide a warm-water fishery for an average of 61 fishermen per day or 22,340 visitors annually. The two miles of channel work will consist of clearing and debris removal, but this type of work does not destroy the canopy nor reduce the depth of flow in the channel. The clearing and debris removal will improve the hydraulic efficiency of the channel, and floodwaters will be removed more efficiently. The Service expects some minor reduction in fishery resource in this reach due to the planned channel work and subsequent maintenance. However, this is currently a low quality resource.

Upland game areas available for hunting will not be affected by the project except during the period when parts of the 319 acres of flood pool will be inundated, also the additional 100 acres of wildlife habitat created by the land treatment program will be available.

Because of ponding water behind the floodwater retarding structures, ground water levels will increase in shallow wells or dug holes located immediately adjacent to the pools of the retarding structures, the effect will occur only in the immediate vicinity of the pools and will not have major effects on the environment or the ecosystem within the watershed.

Neither will base flow volumes in perennial streams be affected by the three floodwater retarding structures. The structures will be initially filled with water during the wet season so as not to affect normal stream flow, and designed to store the 100-year, 10-day runoff. An ungated orifice will be installed two feet below the top of the riser in

Environmental Impacts

each of the structures, and the orifices will be sized so that they will release 0.1 cubic foot per second per square mile of drainage area with two feet of head. The orifices will assure a release from the structures equal to the 10-year, seven-day low flow.

Another expected change is that temperatures of stream water immediately below the outlets of the structures will be increased slightly during the summer months and decreased slightly during the winter months.

Installation of the three proposed impoundments also will have major impacts on the biological productivity of the approximately one mile of the main channel and two miles on the laterals that will be inundated. Dominant species of fish in these reaches will be changed from stream types to warm-water impoundment types. The overall productivity of these reaches will be increased as a result of the creation of 219 acres of surface water. These wet, forestland areas will be permanently lost as terrestrial species habitat, as well as a source of timber. Waterfowl populations can be expected to increase in this improved habitat. Since the aquatic productivity of these reaches is presently very low, however, any losses of species here would not significantly affect total productivity of the watershed. Upstream from the proposed reservoirs aquatic productivity is expected to be unaffected. The impact on productivity of terrestrial species in the 319 acres of flood pool will depend on the extent, duration, and time of flooding. The primary detrimental effect would be increased hazards affecting reproduction of small game species such as quail and rabbit.

With the planned impoundments biological productivity downstream from the structures is expected to improve. For example, turbidity reductions will increase fish propagation areas and reduce the destruction of food chain organisms. (Heimstra (22) has shown that silt turbidity alone will reduce the activity of largemouth bass and sunfish, making these fish less able to find food and more susceptible to predation.)

Installation of the project will require the clearing of 298 acres of forest which will be lost as timber producing area. Of the total acres to be cleared, 219 are in the permanent pool areas of the structures, 78 acres are in the dams and spillways, and one acre in an access area.

In addition, alterations to eight bridges, 4,500 feet of public roads, and public utilities (pipelines, telephone lines, and powerlines) will cause some traffic disruption and inconvenience to the local residents. However, the one family to be relocated will not have to move out of the neighborhood, but will be relocated in qualified housing as required by the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 - Public Law 91-646.

Further construction of the project will provide 24.4 man-years of employment for local labor, and the presence of the lakes will stimulate local bait and tackle business. The three recreation areas to be constructed will require maintenance, thus creating one new job for the life of the project. Due to the appeal of the waterfront land, land values around the structures will also increase, although there will be a flooding easement on the land around the permanent pools. However, the sponsors will control development around the lakes to insure sanitation requirements are met.

The multiple-purpose structures will be located north of United States Highway 70 where the population is sparse, so noise during construction will not be a problem. In any case, channel work will be accomplished with light equipment, and noise levels will be below problem magnitude.

An average of about 20 visitors per day is expected at each recreation lake, and this low number should keep traffic problems to a minimum. A full-time employee assigned to maintain access areas to the lakes will control pollution problems.

Non-Structural Measures

Zoning of Stoney Creek will prevent flood plain land use not compatible with flooding. Buildings thus will be excluded, but more recreational uses of the flood plain may reasonably be expected. Zoning of Stoney Creek is the first step toward qualifying those who have already built in the flood plain for flood insurance.

Although no firm plans have been made for more extensive recreational use of the flood plain, the Goldsboro Department of Planning recognizes the potential for pedestrian greenways along Stoney Creek and recommends this use of the land (7).

With the planned project installed, there will be approximately \$83,300 annual flood damage reduction benefits, but approximately \$24,000 of annual benefits will be foregone, because there will be 404 acres, 310 acres, and 142 acres that will continue to be flooded by the 100-year, 10-year, and one-year storms respectively.

No places of historic or archaeological value are anticipated to be affected by the project installation. If any such values are discovered, by the field survey or construction, work will be halted until an evaluation is made.

FAVORABLE ENVIRONMENTAL EFFECTS

- (a) Reduce area inundated by the 100-year frequency flood from 549 acres to 404 acres.
- (b) Reduce from 563 acres to 304 acres average annual acres flooded.
- (c) Reduce sediment yield at the mouth of Stoney Creek by an average 20,800 tons annually.
- (d) Reduce sediment deposition in channels, thereby reducing flooding and swamping problems.
- (e) Reduce runoff rates and increase infiltration on land adequately treated.
- (f) Reduce turbidity of stream water and improve fishery resources.
- (g) Reduce damage to crops and pasture by 70 percent; reduce other agricultural damages 50 percent; and reduce non-agricultural damages 75 percent.
- (h) Provide 22,340 visitor days of recreation annually.
- (i) Reduce by 1.5 feet in the the urban area depth of flooding from the 100-year frequency flood.
- (j) Reduce flood-caused interruptions of transportation facilities, business activities, and normal community life.
- (k) Create 24.4 man-years of new employment during construction and one new job over the life of the project.
- (l) Provide for more efficient utilization of land and water resources and conserve land and water resources for future use.
- (m) Prevent by flood plain zoning increase in potentially damageable properties.
- (n) Develop 100 acres of upland wildlife habitat.
- (o) Create 219 acres of fish habitat.

ADVERSE ENVIRONMENTAL EFFECTS

- (a) Temporarily increase sedimentation during construction.
- (b) Restrict use of land in structures' flood pools to activities not damaged by periodic flooding.
- (c) Clear 219 acres of forestland for the permanent pools of the watershed lakes with resulting loss of wildlife habitat and timber producing potential.
- (d) Clear 79 acres of forestland for the three structures, spillways, and access areas with resulting loss of wildlife habitat and timber producing potential.
- (e) Cause relocation and associated inconveniences for one family.
- (f) During construction cause disruption of traffic with associated inconveniences.
- (g) Convert approximately three miles of streams to impounded water for the permanent pools of structures.
- (h) Produce a temporary detrimental effect on the stream fishery resource in Reaches IIA and III during channel clearing and debris removal.

ALTERNATIVES

Land Treatment Only

The alternative of land treatment only would involve application of those practices and measures previously described under the heading of Planned Project - Land Treatment. Environmental impacts would be the same as those discussed in the Environmental Impacts - Land Treatment section.

This alternative would avoid all adverse environmental effects of the planned project. However, favorable environmental effects of flood damage reduction and additional recreational opportunities would be foregone by not including the multiple-purpose structures and channel clearing. See Table V. The cost of this alternative is estimated to be \$141,000.

Land Treatment with Channel Clearing

Channel clearing and debris removal in Reaches IIA and III would increase channel velocity by 20 percent and would increase channel capacity from

Alternatives

540 cubic feet per second to 650 cubic feet per second. A 100-year frequency storm would produce a peak flow of about 3,300 cubic feet per second, but channel clearing and debris removal would reduce the peak stage of this storm by approximately 0.2 foot. With structural works limited to channel clearing, all buildings subject to flooding from this storm would continue to flood. However, damages from smaller storms would be reduced. The estimated average annual cost of channel clearing is \$1,770 (\$30,000 installation cost), and average annual flood damage reduction benefits are \$14,120.

Except for the detrimental effect that channel clearing and debris removal would have on the stream fishery resource, adverse effects of the total planned project would be avoided. Floodwater and sediment damages of about \$93,000 annually would continue (See Table V). No additional recreational opportunities would be afforded by this alternative.

Land Treatment and Three Structures

Accelerated land treatment and three multiple-purpose structures would reduce floodwater damages by approximately \$40,000, sediment damages by about \$21,400, and indirect damages by \$8,000 annually. Floodwater damages of approximately \$37,900 annually would continue (see Table V). The average annual cost of the three structures would be approximately \$87,000 and the average annual benefits about \$110,000.

Acres flooded under each alternative by the 100-year, 10-year, and one-year storms are compared in Table VI.

Except for temporary detrimental effects of stream clearing, all other adverse effects of the planned project would also result from this alternative.

Land Treatment, Three Structures, and Channel Enlargement

Also evaluated was an alternative composed of land treatment, three multiple-purpose structures, and channel enlargement from United States Highway 70 downstream to Station 553+00, just below Secondary Road 1920, a distance of 18,840 feet. The channel would be designed to keep the 25-year storm within banks, although some low-lying areas along the creek would continue to flood (see Table VI).

This alternative would reduce average annual flood damages from \$107,300 to \$9,200 (see Table V). Flooding from the 100-year storm would be removed from all dwellings and businesses now subject to damages from this event. Acres flooded by the 100-year storm within the built-up area would be reduced by 78 percent, and damages from the six-month storm would be eliminated. Average annual benefits would total about \$150,000, but would be less than the average annual cost of \$165,000.

All adverse effects of the planned project would still occur with this alternative. In addition, sediment produced by channel enlargement would increase stream water turbidity during construction.

Flood Proofing, Flood Plain Zoning, Flood Plain Insurance, and Land Treatment

This alternative would consist of (a) constructing dikes, walls, or other barriers around existing buildings and other property within the 100-year flood plain where practical and possible; (b) providing flood plain insurance to compensate for flood damages to buildings or other properties not practical to flood proof or for flood damages from storms greater than the 100-year frequency event; (c) the adoption of flood plain zoning to prevent future developments subject to flood damage within the 100-year flood plain; and (d) installation of conservation land treatment over the watershed.

Flood proofing of 14 houses, five apartment units, three business establishments, and three college buildings would be required. Several roads and bridges would also have to be raised to prevent overtopping by floodwaters. Extensive borrow areas would be required to supply the needed fill material for dikes and road modifications.

Flood plain insurance could be provided under the National Flood Insurance Program for compensation of damages to cars, lawns, fences, or other properties not practical to flood proof. This program is intended as a means by which flood insurance, never made generally available by the private insurance industry, can be offered through federal subsidy to owners of existing flood-prone structures. Participation on the voluntary program requires the adoption of land use and control measures by a community prior to the insurance being made available. The measures adopted must meet the standards set by the Federal Insurance Administration, United States Department of Housing and Urban Development. These requirements will be met through the adoption of zoning ordinances by the city of Goldsboro on 549 acres (100-year flood plain) adjacent to Stoney Creek. Such zoning would exclude any new buildings or other development subject to flood damage within this area.

The land treatment program involved with this alternative would be the same program associated with the selected plan (see Land Treatment section of WORKS OF IMPROVEMENT TO BE INSTALLED). Landowners would install conservation measures on their land with assistance from Wayne Soil and Water Conservation District and the North Carolina Division of Forest Resources.

Practically all floodwater damages through the urban reaches of the watershed would be eliminated or compensated with adoption of this alternative. Flood damage reduction benefits to commercial and residential properties would amount to a gross value of \$69,180 annually. In addition, indirect damages such as interruptions of traffic, business, etc., would be reduced or eliminated. Additional flood damages that might occur to future developments in the flood plain would be eliminated. Adoption of this alternative would eliminate the need

Alternatives

for clearing about 300 acres of forestland associated with the three structures in the selected plan. Relocation of a family associated with construction of one of the structures would also be avoided. Any adverse effects associated with the proposed channel work would not be sustained. Although sediment loads in the streams would probably be increased during construction of the dikes, the severity of these increases and associated effects would be less than those associated with construction of the dams.

Selection of this alternative would mean that floodwater damages to crop and pasture land and other agricultural (\$2,590 average annual) and swamping damages (\$5,730 average annual) would continue. A total gross average annual agricultural benefit of \$5,375 afforded by the selected plan would be foregone. Also lost would be the sediment reduction benefits provided by the proposed structures (\$9,300 average annual gross value). Gross recreation benefits of \$33,065 resulting from the water-based recreational opportunities provided by the structures would be eliminated in an area that badly needs such resources (see Recreation section of WATER AND RELATED LAND RESOURCE PROBLEMS). Installation of the proposed plan is expected to reduce the 100-year flood plain along Stoney Creek by about 100 acres. Enhancement of this land will thus occur as its development for commercial, residential, or business use is already taking place or expected. This benefit (estimated at \$5,715 gross average annual) would likewise be lost with exclusion of the structures and channel work. A portion of the secondary and redevelopment benefits (see Appendix A) would be lost although no practical estimate of the loss was made. Total benefits that can definitely be considered as foregone with this alternative amount to a gross value of about \$58,000.

The average annual cost of flood proofing existing buildings in the 100-year flood plain would amount to \$58,600 annually. No accurate estimate of the cost of flood plain insurance is available. The cost to individual property owners would depend on the potential for damage to the property, the degree of flood proofing, etc. In any event, the annual insurance premium would be a significant part of the anticipated flood damages expressed on an average annual basis. A cost estimate for developing flood plain zoning ordinances was not made.

Purchase of Land and Improvements

Purchase of land and improvements would require relocation of business establishments, several families, farm operations, and a Bible college with estimated cost of purchase \$1,500,000. The alternative would not reduce sediment and gross erosion damages, but adverse effects of the planned project would be avoided.

No Project

Continuation of the present land treatment program would reduce erosion and sediment from adequately treated land. Flood damages would continue at the rate of approximately \$107,300 annually. During the next 10 to 20 years as the area south of Secondary Road 1003 is converted to urban uses, sediment production due to construction activities would add to the problems of channel aggradation, swamping, and flooding. Runoff from the urbanized area also would be increased. Even with runoff reduced on adequately treated farmland, the area flooded by a given storm would increase.

This alternative would, of course, avoid all the adverse effects of the planned project. The present stream fishery would be preserved. In addition, the bottom land and upland wildlife habitat would remain in their present state except for urban encroachment.

If the planned project is not installed, net annual benefits of about \$38,965 would be foregone.

TABLE V
Estimated Flood Damages and Benefits by Alternatives

<u>Alternatives</u>	<u>Damages</u>	<u>Benefits</u>
No Project	\$107,300	\$ 0
Land Treatment	\$ 95,540	\$11,760
Land Treatment and Channel Clearing	\$ 93,180	\$14,120
Land Treatment and Three Structures	\$ 37,900	\$69,400
Land Treatment, Three Structures, and Channel Enlargement	\$ 9,200	\$98,100

TABLE VI
Acres Flooded - by Storms and Alternatives

<u>Alternatives</u>	<u>100-Year</u>	<u>Storms</u>	
		<u>10-Year</u>	<u>1-Year</u>
		----- acres-----	
No Project	549	422	258
Land Treatment	Not evaluated in detail		
Land Treatment and Channel Clearing	Not evaluated in detail		
Land Treatment and Three Structures	424	336	213
Land Treatment, Three Structures, and Channel Enlargement	292	180	76

SHORT-TERM VERSUS LONG-TERM USE OF RESOURCES

The long-term productivity of agricultural land in the watershed will be enhanced by the accelerated application of land treatment measures. In addition, the project is compatible with the established trend (7) of urbanization in the middle reaches of the watershed. Continuing development will be directed away from flood-prone land, and project measures will aid long-range development potential. For example, flood plain zoning and structural works will provide floodwater and sediment damage reduction for more than the designed life of the project. Although the sediment pools of the structures are expected to be filled at the end of 100 years, the floodwater retarding function will not be impaired. Furthermore, even though flood plain zoning will exclude commercial, industrial, and residential building in most of the flood plain, it will not preclude uses which can tolerate occasional flooding. Thus the project will reduce options for long-term use only on areas incorporated into the dams, spillways, sediment pools, and flood pools of the structures.

On a short-term basis, clearing of land for structures will produce increased sediment during the period of construction. But since all exposed embankment areas, spillways, borrow areas, and other areas so disturbed will be vegetated as construction progresses, sediment will be kept to a minimum. Debris basins, diversions, and other similar measures will also be used to prevent sediment damage during construction, and soil disturbed during construction will be stabilized within a year.

In addition to this project, a number of others are proposed or underway. According to a river basin study conducted by the United States Department of Agriculture and the State of North Carolina, nine applications for assistance under Public Law 566 have been received for watersheds in the Neuse River Basin, an area of about 6,000 square miles. Construction has been authorized for seven Neuse River watersheds, covering approximately 643 square miles. Works of improvement have been installed in four of the watersheds in an area of 149.45 square miles.

Besides the Falls of the Neuse project, a water supply reservoir in Wake, Durham, and Granville Counties, the United States Army, Corps of Engineers, has four small flood control projects approved for construction in the Neuse River Basin:

- Mill Creek in Johnston County (channel)
- Mocassin Swamp in Johnston and Wayne Counties (channel and dike)
- Nahunta Swamp in Wayne County (channel and reservoir)
- Thoroughfare Swamp in Wayne County (channel and reservoir)

Examination of other possible effects reveals that installation of the proposed project will not cause any measurable decrease in flood peaks on the Neuse River and will reduce sediment delivered into the Neuse River by 20,800 tons annually.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The 219 acres of forestland to be cleared and permanently covered by water, the 78 acres of forestland and five acres of cropland to be permanently committed to dams and spillways, and the four acres of cropland and one acre of forestland to be used for access areas to the lakes will become unavailable for other beneficial land uses.

In addition, flood pools of the three structures will require 319 acres. The fringe of the flood pools nearest the permanent pools will be flooded frequently, and the area farthest from the permanent pools will be flooded infrequently. Although a timber management program can be carried out in the flood pool areas, buildings cannot be constructed there.

The labor and materials required for project installation also will be irretrievably committed to water resource development.

CONSULTATION WITH APPROPRIATE AGENCIES AND OTHERS

General

All interested individuals and agencies, state, and federal, were invited to participate in all meetings during application and planning stages. The North Carolina Division of Forest Resources and the United States Forest Service made inputs into the work plan. The suggestion of the United States Fish and Wildlife Service that channel clearing be deleted from the lower reaches of Stoney Creek (Reaches I, IA, and II) also was included in the plan.

The field examination of Stoney Creek Watershed was held December 17, 1964. Forty-four persons, including nine landowners, attended. Notice of the field examination was sent to 42 interested persons and agencies.

A meeting of the Stoney Creek Watershed Advisory Committee was held December 13, 1965, to secure landowners' signatures on a petition seeking creation of a Stoney Creek Watershed Drainage District. Owners of more than 5,500 acres of land signed the petition.

On December 28, 1966, a feasibility hearing was conducted by the Wayne County Clerk of Court to hear the report of the Board of Viewers, and 11 persons testified in favor of the project. There was no opposing testimony.

A public hearing on flood plain zoning of Stoney Creek Watershed was conducted by the Goldsboro Board of Aldermen on March 9, 1971, with about 200 persons attending. No action was taken by the board after this meeting. But a second public hearing was conducted by the board August 30, 1971, and after this hearing, the board zoned a floodway

Consultation

along Stoney Creek below the proposed structures. The board also zoned for nondevelopment the permanent pool and flood pool areas of proposed Structures Nos. 2 and 3.

The following agencies and groups were asked to comment on the draft environmental statement:

United States Department of the Army; United States Department of Commerce; United States Department of Health, Education, and Welfare; United States Department of the Interior; United States Department of Transportation; Environmental Protection Agency; Advisory Council on Historic Preservation; North Carolina Department of Natural and Economic Resources (for the Governor); and North Carolina Department of Administration, State Planning Division (State and Regional Clearinghouses); Office of Equal Opportunity; Federal Power Commission; National Resource Defense Council; Friends of the Earth; Environmental Defense Fund; National Wildlife Federation; National Audubon Society; Environmental Impact Assessment Project.

Comments were received from the following agencies and groups:

United States Department of Health, Education, and Welfare; United States Department of Transportation; Environmental Protection Agency; Advisory Council on Historic Preservation; North Carolina Department of Administration; North Carolina Department of Natural and Economic Resources; North Carolina Department of Cultural Resources; North Carolina Department of Human Resources; North Carolina Department of Transportation and Highway Safety; Agricultural Extension Service.

A summarization of comments received on the draft environmental impact statement with appropriate responses is listed below:

United States Department of Health, Education, and Welfare

1. Comment: The proposed action will have only a minor impact upon the human environment with respect to the concerns of this department.

Response: No response needed.

United States Department of Transportation (United States Coast Guard)

1. Comment: We have no comment to offer, nor do we have any objection to this project.

Response: No response needed.

United States Environmental Protection Agency

1. Comment: The subject creek is spelled Stony in the North Carolina stream classification publication and also in the USGS Quadrangle Map "Goldsboro."

Response: The application for assistance filed by the local sponsors used the spelling Stoney Creek. The Soil Conservation Service has continued to use that spelling. This appears to be the accepted local spelling, judging from local newspaper articles.

2. Comment: Both Stoney Creek and its major tributary, Howell Creek, have been upgraded from Class "D" to Class "C" by the North Carolina Environmental Management Commission on August 22, 1974.

Response: This information is included in the final work plan and environmental impact statement (see page five of the work plan and page 34 of the environmental impact statement).

3. Comment: In order to comply with Section 404 of Public Law 92-500, a permit should be sought from the Corps of Engineers.

Response: At this time both the Corps of Engineers and Environmental Protection Agency are considering the permit requirement for the construction of projects such as Stoney Creek. The Soil Conservation Service and the Sponsors stand ready to abide by decisions that may be rendered on this issue. If permits are required, they will be obtained before construction is initiated.

4. Comment: The final statement should outline measures for protecting wetlands.

Response: The proposed project will not have a measurable effect on the wetlands in the watershed. As stated on page eight of the environmental impact statement "These areas are flooded primarily during winter and early spring months with the extent and duration of flooding being largely influenced by backwater flooding from the Neuse River." Stoney Creek, after the project is installed, is expected to have frequent out-of-bank flood (see Table IV, page 36).

Advisory Council On Historic Preservation

1. Comment: Pursuant to our responsibilities under the National Environmental Policy Act of 1969, we have determined that your draft environmental statement appears adequate in our area of expertise.

Response: No response needed.

North Carolina Department of Natural and Economic Resources

1. Comment: There is no specific mention of any relationship between land treatment measures and protection of the three reservoirs from sedimentation. It is our understanding that the Soil Conservation Service has a requirement that 75 percent of the critical erosion areas above structures be adequately treated before project completion. The only reference to critical areas is that three acres of critical area planting will be carried out at some point during the project. This item warrants further clarification.

Response: The Soil Conservation Service requires that not less than 75 percent of the effective land treatment measures must be installed, or their installation provided for, on those sediment source areas which, if uncontrolled, would require a material increase in the cost of construction, operation, or maintenance of the structural measure. This requirement has been met in the Stoney Creek Watershed. Refer to Table No. II and Table No. III for the erosion rates before and after project land treatment measures.

2. Comment: It is the opinion of the Water Quality Branch of this agency that vegetative material should be removed from the reservoir site or burned, rather than buried in order to avoid increased oxygen demands on the reservoir that may result from the buried vegetative material. Such oxygen demands could result in water quality degradation in the reservoirs.

Response: The final drafts of the work plan and environmental statement require vegetative material to be burned where possible.

3. Comment: During a protracted period of low stream flow and high evaporation losses, water levels in the reservoirs could get so low that the ungated orifices would not serve their purpose. This possibility should be checked.

Response: The highest evaporation rate determined in a 10-year study of Lake Michie by United States Geological Survey was .25 inch per day. Using this rate of evaporation, the Soil Conservation Service has determined that the water stored above the ungated orifices will supply the seven-day, ten-year low flow for a period of 59 days at Structure No. 39, 44 days at Structure No. 3, and 58 days at Structure No. 2. This assumes no water flowing into the reservoirs.

4. Comment: Recreation activities in the watershed are described and visitation shown. There could have been added information showing that the unmet needs in the county (mostly Goldsboro) are 21 acres of neighborhood emphasis areas, seven acres of community emphasis areas, and 132 acres of city parks.

North Carolina Department of Natural and Economic Resources (continued)

Response: The information supplied is included in the Recreation Problems section of the final work plan and environmental impact statement.

5. Comment: Recreation facilities in Wayne County are described as relatively high. The State Comprehensive Outdoor Recreation Plan (SCORP) 1973 backup data show unmet needs as: 160 acres of Class I sites, 2,324 acres of Class II sites, and 24,927 acres of Class III sites. This suggests that recreation facilities should be described as moderate to low.

Response: This information is included in the final work plan and environmental impact statement. The reference to recreation availability from the Community Facilities Plan, Wayne County, North Carolina, is deleted from the plan and statement, since the information from SCORP is more recent.

6. Comment: A need is quoted for 9,225 acres of General Outdoor Recreation sites in multi-county planning region "P." The figure is correct but reservoir water cannot contribute to all types of sites. Reservoirs can contribute to the unmet needs of the county for county parks and Specialized Outdoor Recreation Areas with medium intensity use.

Response: The reference to general outdoor recreation needs in Region "P" has been omitted from the final work plan and environmental impact statement since the information obtained from the supporting data for SCORP is specific to the watershed area.

7. Comment: Recreation visitation to the three reservoirs is stated as 22,340 per year. Considering how near they are to the residential and the built-up areas of Goldsboro, the estimates appear low (or they may be based on what the minimal facilities can handle). There would have been advantages to expanding the facilities being provided.

Response: The facilities planned at the reservoirs were a major factor in estimating visitation. If the priorities of the sponsors permit expansion of facilities in the future a considerably greater use of the structure sites would be expected.

8. Comment: Overall, it is the opinion of the Department of Natural and Economic Resources that the draft environmental impact statement is comprehensive and objective in its presentation of the anticipated environmental impact of the proposed project. Furthermore, the Department of Natural and Economic Resources feels that this project is a well planned and worthwhile undertaking and definitely warrants implementation in the near future.

Response: No response needed.

Consultation

North Carolina Department of Natural and Economic Resources (continued)

9. Comment: The area surrounding the lakes will come under increasing pressure for urban development. It is important for local governments to recognize this and understand that development may result in adverse environmental effects in the form of increased sedimentation, increased runoff from impervious surfaces, and loss of wildlife habitat.

Response: This subject was discussed with the sponsors on several occasions, notably at the public meeting held July 30, 1974.

North Carolina Department of Natural and Economic Resources - Wildlife Resources Commission

1. Comment: The modifications made in the project plan over the years emphasize the fact that many conflicts of interest inherent in watershed development are susceptible to reconciliation through compromise. The trade-off of 300 acres of mixed hardwood and pine habitat - plus another 300-plus acres which will be intermittently flooded, for 219 acres of permanent manageable recreation flatwater and 100 acres of farmland managed for wildlife is acceptable in view of the flood prevention benefits assured to Goldsboro.

Response: No response needed.

2. Comment: Loss of timber production on 300 acres of land is mentioned in the environmental impact statement, but not explicitly accounted for in the project costs. A modest sum of \$20 per acre would amount to a sizable total sum. Should not this cost be included in the annual cost of the project?

Response: The loss of income from timber production is accounted for in the cost of land rights. The cost of land includes the present value of the income which will be foregone. Land rights and other installation costs are amortized and expressed as annual costs.

3. Comment: We recommended that the clearing and snagging operation disturb the stream bed as little as possible below the present low flow elevation so that some essentials of the fish habitat can be maintained.

Response: The clearing and snagging work will disturb the stream bed only where log jams and channel debris are removed.

North Carolina Department of Natural and Economic Resources -
Wildlife Resources Commission (continued)

4. Comment: The Wildlife Commission recommends that definite provisions for a continuing program of reservoir fish management be incorporated into the final work plan agreement. The statement is made on page 10 of the watershed work plan that a fish management program will be followed, but no reference to it appears elsewhere.

Response: Under the watershed work plan agreement the operation and maintenance of the structural works of improvement will be the responsibility of the Wayne County Board of Commissioners. The reference to a fish management program is on page 10 of the watershed work plan addendum rather than the work plan itself.

North Carolina Department of Human Resources (Division of Health Services)

1. Comment: The area under consideration was once a malaria problem and any alterations to the stream in this area either by channelization or clearing and snagging should be given careful consideration.

Response: The stream clearing and snagging, which is planned, will facilitate the flow of water in the urban reaches of Stoney Creek (Reach IIA and Reach III - see Project Map). The construction procedures to be followed in this area will assure that no ponded water will be created.

North Carolina Department of Transportation and Highway Safety

1. Comment: This will be a beneficial project insofar as roads in the area are concerned. Minor adjustments will have to be made to several roads.

Response: Road modifications have been included in the planned project.

Agricultural Extension Service

1. Comment: We do not have any comments before the final environmental impact statement is made.

Response: No response needed.

Consultation

The following comments were received after the due date of January 22, 1975, and after the final statement had been prepared. A copy of the original comments is included in Appendix E as pages 16-19.

United States Department of the Interior

1. Comment: To achieve these benefits, we feel that an effective fish management plan is imperative since the resultant fishery would be somewhat marginal at best, even with proper management. Therefore, a fish management plan for the three reservoirs should be described in the work plan.

Response: As indicated on page 19 of the final environmental impact statement, a specific agreement for the operation and maintenance of structural works of improvement will be executed prior to signing a project agreement. We agree that an effective fish management plan is necessary to achieve desired recreational benefits from the reservoirs. The sponsors are aware of the management assistance available from the Service biologist, North Carolina Wildlife Resources Commission, and the United States Fish and Wildlife Service. This assistance will be requested for the fish and wildlife portion of the operation and maintenance plan. This plan will be prepared prior to the signing of a project agreement.

2. Comment: We recommend that this project feature (clearing and snagging) include a minimum of streambed and streambank cover disturbance and destruction, and that the work plan describe the clearing and snagging procedures to be employed.

Response: The final environmental impact statement states on page 13 that clearing and snagging will consist of removing channel debris, log jams, and adjacent trees which lean over the channel 30 degrees from the vertical. It also states that small, light construction equipment will be used. With no channel excavation, no major clearing or spoil disposal, and no "cleared" travelway intended, a minimum of streambed and streambank cover will be disturbed.

3. Comment: The location map at the back of the report shows that the upper half of the basin has "drainage" problems. If there are drainage problems in the upper part of the basin now, the three proposed reservoirs will make it considerably worse.

Response: A study of the problem location map along with paragraphs 2 and 3 on page 22 of the final environmental impact statement will give the reader a fair description of the topography of the watershed. Drainage problems are described on page 32-33. The land having drainage problems is separated from the main

United States Department of the Interior (continued)

channels by bands of erosion-prone land. Since the valleys are 20-40 feet deep, the problem is not that main channels are inadequate for outlets. It is more of getting the surface and sub-surface on-farm drainage to the main channels.

4. Comment: The aerial photograph contained at the back of the report shows that only a few houses are located in 100-year flood plain and the width of this area is not greatly affected by the project. Both the damage figures and annual savings appear to be greatly exaggerated; the figures should be substantiated.

Response: Damages, including urban, were based on stage-damage relationships with and without the planned project according to the published guidelines and procedures of the Soil Conservation Service. Details of the analysis are on file in the Raleigh State Office and available for review. (See also pages 30-31 of the final environmental impact statement.)

5. Comment: We note that, on page 30, the estimated value of the property affected by flooding is \$1,069,000. The total cost of the project is \$1,541,579. It would appear that one alternative course of action, which we suggest should be considered in this statement, would be for the Federal government to buy the flood plain.

Response: Purchase of the land and improvements was considered as an alternative (see page 21 of the draft work plan). In addition to the estimated purchase cost of \$1,500,000 there would be relocation payments to 19 families, three businesses, and the college. This alternative would not reduce sediment damages nor provide the water-based recreation benefits of the planned project. We know of no authority whereby the federal government could purchase the entire flood plain of Stoney Creek for the purpose of reducing flood damages.

6. Comment: If the channel clearing serves its intended purpose, it would seem that the downstream areas would be adversely affected.

Response: Channel clearing and debris removal will improve the hydraulic efficiency of the channel which will cause floodwaters to move through this section faster thereby increasing flooding in the lower section. However, the entire project must be considered as one unit. The retarding structures will provide floodwater control from 13 square miles of the drainage area. These structures will delay floodwaters from reaching the improved channel. Your attention is invited to Table IV, page 36 of the final statement which gives the acres flooded for various storms both with and without the project.

Consultation

United States Department of the Interior (continued)

7. Comment: The rate of erosion given on page 31 is 3,900 tons/mi²/year delivered to the mouth. We do not have any sediment data for Stoney Creek but we do have data for Nahunta Swamp which borders Stoney Creek Watershed on the north. Our data show sediment runoff of 60 tons/mi²/ year or about one-twentieth the value given. These sediment runoff estimates should be substantiated. Furthermore, if these estimates can be substantiated, they suggest that proposed reservoirs will have a short life.

Response: The comment concerning erosion and sediment suggests all eroded soil in the watershed is delivered to the mouth of Stoney Creek. Table No. II (page 32) in the final statement shows the annual gross erosion and is footnoted as to the amount of sediment actually delivered to the mouth of the watershed. Table III (page 35) gives the same information for the with project conditions. It is not clear whether the sediment figure quoted for Nahunta Swamp is suspended sediment or includes both suspended bedload sediment. Any comparison of Nahunta Swamp and Stoney Creek should include all delivery characteristics of both streams, including topography, soils, land use, etc.

The sediment estimates do not indicate a short life for the floodwater retarding structures since the design was based on a 100-year life with the sediment figures as indicated.

8. Comment: The affected mineral resources (marl, sand, and gravel, and poor quality slate) are common and widespread throughout the coastal plain of North Carolina; as a result, the proposed project should have no significant effect upon availability or supply, although this is not specifically stated in either the work plan or the environmental statement.

Response: We would have had no objection to the information concerning the mineral resource being included in the environmental impact statement. However, as you have stated, there is no production in the watershed; the resource is common in the surrounding areas; and the proposed project will not significantly affect the resource. We, therefore, feel that a revision in the final statement is not warranted.

9. Comment: Project modifications have removed most of the objectionable environmental effects. The project now involves conversion of 219 acres of forestland to permanent pools and 80 acres for dams, spillways, and access areas. The reservoirs can provide new warm-water fishing opportunities if managed properly. Downstream areas will be affected by clearing and snagging, increased turbidity, and reduction in overbank flooding.

United States Department of the Interior (continued)

Response: Conversion of forestland to permanent pools, dams emergency spillways, and access areas and temporary increase in sedimentation during construction are recognized under ADVERSE ENVIRONMENTAL EFFECTS on page 41 of the final statement. Fishing opportunities in the reservoirs are recognized as recreational benefits under FAVORABLE ENVIRONMENTAL EFFECTS, page 40. Table No. IV (page 36 of the environmental statement) gives the acres flooded by reaches for various storms both with and without project conditions.

10. Comment: Hunting opportunities will be lost or greatly curtailed in the 80 acres required for the dams, spillways, and access areas. On page 10 of the addendum to the draft work plan, it is stated that no hunting will be allowed in the reservoir area, except on a controlled basis as determined by the North Carolina Wildlife Resources Commission. Therefore, future hunting opportunities in the 319 acres of flood pools are uncertain. In addition, there is no reference as to whether waterfowl hunting will be permitted in the lakes.

Response: Hunting opportunities will be lost or greatly curtailed in the 80 acres required for the dams, spillways, and access areas and is recognized as an adverse environmental effect on page 41 of the draft environmental statement.

The addendum was added to Stoney Creek Watershed Work Plan as a phase in for the Principles and Standards for Planning Water and Related Land Resources. It discusses the selected or proposed plan on pages 1 - 6. An abbreviated environmental quality plan is discussed on pages 7 - 13. This environmental quality plan is not necessarily the selected plan. It was suggested in this plan that land connected with the reservoirs be set aside as wildlife sanctuaries. This was not a part of the selected plan. The selected plan anticipated the reservoir being used principally for fishing and pleasure boating and not hunting. The 219 acres of impounded water represents a significant waterfowl habitat area. In our opinion, whether hunting is allowed or not is not a critical issue at this point in time. A future decision could be made based on waterfowl use of the area. It might well be that a refuge area could be of critical importance in the Goldsboro area.

11. Comment: Approximately three miles of aquatic stream habitat will be permanently inundated by water in the three reservoirs. Thus, these stream sections will no longer provide habitat for stream-dwelling fishes and benthic organisms and associated wetland wildlife species. Similarly, the somewhat limited stream fishing opportunities now provided by these stream sections will be lost.

Consultation

United States Department of the Interior (continued)

Response: Impacts on the biological productivity in one mile of the main channel and two miles of laterals are recognized on page 38 of the draft environmental statement. The conversion of these three miles of stream impounded water is listed as an adverse environmental effect on page 41. The present fishery resource in Stoney Creek is discussed on page 24.

12. Comment: Potential impacts related to geologic conditions are adequately discussed in the environmental statement.

Response: No response needed.

LIST OF APPENDIXES

Appendix A - Comparison of Benefits and Costs for Structural Measures

Appendix B - Project Map
Problem Location Map

Appendix C - Urban Flood Plain Map

Appendix D - Bibliography

Appendix E - Comments on the Stoney Creek Watershed Draft Environmental Impact Statement

Approved by Jesse L. Hicks
Jesse L. Hicks, State Conservationist

Date 2-24-75

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Stoney Creek Watershed
Wayne County, North Carolina

(Dollars)

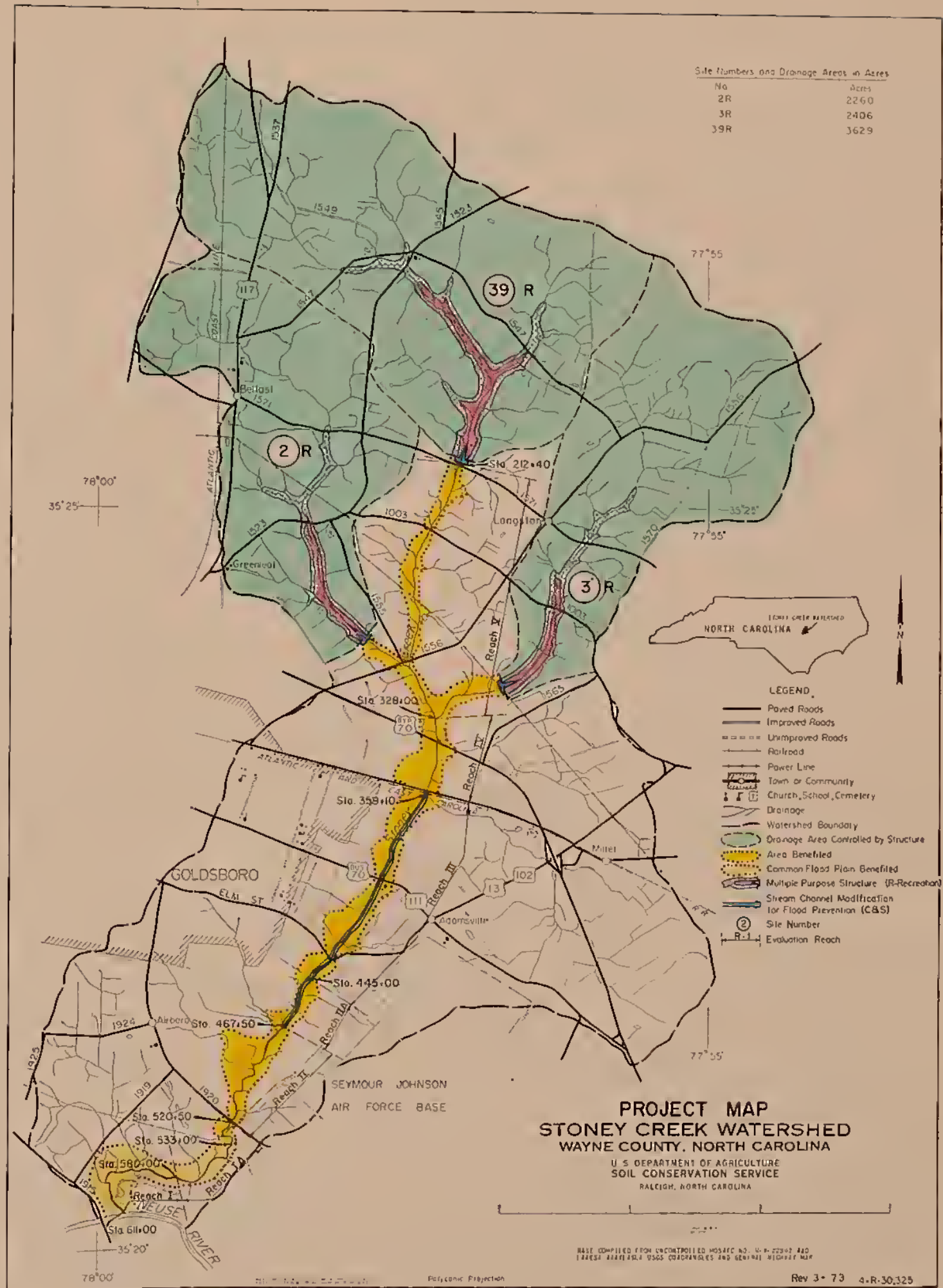
Evaluation Unit	AVERAGE			ANNUAL			BENEFITS/			Average:		
	: : Damage : Reduction	: : More : Intensive	: : Changed Land : Use	: : : : : : Secondary	: : : : : : Redevelopment	: : : : : : Recreation	: : : : : : Total	: : : : : : 2/	: : : : : : Ratio	: : Annual : Cost	: : : : : : 2/	: : : : : : Ratio
All Structural Measures	71,520	1,300	5,715	11,630	10,285	33,065	133,515	87,635	1.5:1.			
Project Administration	xxxxxxx	xxxxxx	xxxxxx	xxxxxxx	xxxxxx	xxxxxxx	xxxxxxx	6,915	xxxxxxx			
GRAND TOTAL	71,520 ^{3/}	1,300	5,715	11,630	10,285	33,065	133,515	94,550	1.4:1.			

1/ Price Base: 1974 prices for all values but agricultural products which are adjusted normalized.
 2/ Based on 1974 prices amortized at 5 7/8 percent interest for 100 years.
 3/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$11,760 annually.

Date: December 1974

Site Numbers and Drainage Area in Acres

No.	Acres
2R	2260
3R	2406
39R	3629



PROJECT MAP
STONEY CREEK WATERSHED
 WAYNE COUNTY, NORTH CAROLINA

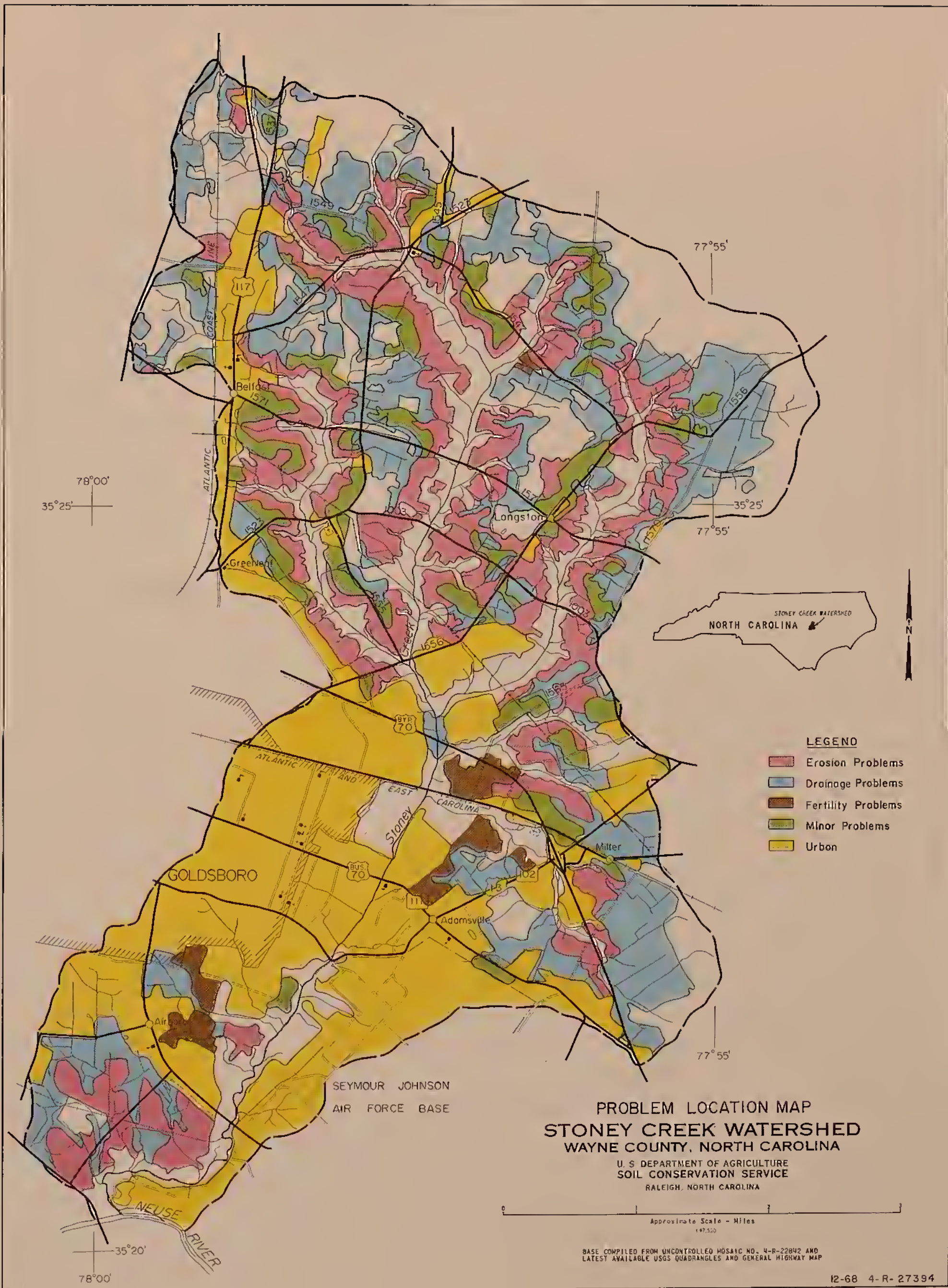
U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 RALEIGH, NORTH CAROLINA

BASE COMPILED FROM UNCONTROLLED MOSAIC NO. U-P-22347 AND
 LATEST AVAILABLE USGS COORDINATES AND GENERAL WATERSHED MAP

Polysomic Projection

Rev 3-73 4-R-30325

4-R-22843



78°00'
35°25'

77°55'

35°25'

77°55'



LEGEND

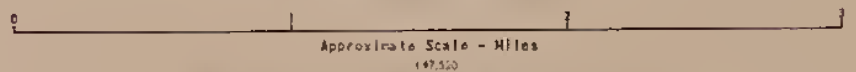
- Erosion Problems
- Drainage Problems
- Fertility Problems
- Minor Problems
- Urban

GOLDSBORO

SEYMOUR JOHNSON
AIR FORCE BASE

**PROBLEM LOCATION MAP
STONEY CREEK WATERSHED
WAYNE COUNTY, NORTH CAROLINA**

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
RALEIGH, NORTH CAROLINA



BASE COMPILED FROM UNCONTROLLED MOSAIC NO. 4-R-22842 AND
LATEST AVAILABLE USGS QUADRANGLES AND GENERAL HIGHWAY MAP

35°20'
78°00'



URBAN FLOOD PLAIN
CITY OF GOLDSBORO
STONEY CREEK WATERSHED
WAYNE COUNTY, NORTH CAROLINA
 U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
 RALEIGH, NORTH CAROLINA

0 1/4 1/2 1 MILE
 SCALE

Rev. 1-73 4-R-27,427

APPENDIX D
BIBLIOGRAPHY

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APPENDIX E
COMMENTS ON THE
STONEY CREEK WATERSHED
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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United States Department of the Interior	E-16



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20201

DEC 4 1974

Mr. Jesse L. Hicks
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

Enclosed is a copy of comments made August 20, 1974 by our Regional Environmental Officer on the draft Environmental Impact Statement for the Stoney Creek Watershed, North Carolina. We offer no additional comments.

Thank you for the opportunity to review this statement.

Sincerely,

Charles Custard
Director
Office of Environmental Affairs

Enclosure

August 20, 1974

Re: 437-7-74

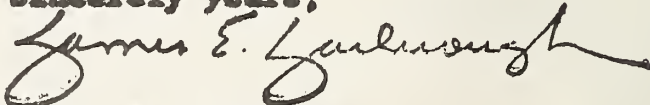
Mr. Jesse L. Hicks
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P. O. Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

Subject: Stoney Creek Watershed
Wayne County, N. C.

We have reviewed the subject draft Environmental Impact Statement. Based upon the data contained in the draft, it is our opinion that this proposed action will have only a minor impact upon the human environment with respect to the concerns of this Department.

Sincerely yours,



James E. Yarbrough
Regional Environmental Officer

bc: Dr. Frank J. Groschelle
Mr. Charles Custard
Mr. Warren Muir



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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

• 6 JAN 1975

• Mr. Jesse L. Hicks
State Conservationist
Soil Conservation Service
P. O. Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

This is in response to your letter of 15 November 1974 addressed to Commandant, U. S. Coast Guard concerning a draft environmental statement for the Stoney Creek Watershed, Wayne County, North Carolina.

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

The opportunity to review this draft statement is appreciated.

Sincerely,

W. E. Caldwell

W. E. CALDWELL
Captain, U.S. Coast Guard
Deputy Chief, Office of Marine
Environment and Systems
By direction of the Commandant



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N. E.
ATLANTA, GEORGIA 30309

January 30, 1975

Mr. Jesse L. Hicks
State Conservationist
U. S. Soil Conservation Service
P. O. Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

We have reviewed the Draft Environmental Impact Statement for the Stony Creek Watershed in North Carolina and have no objection to the proposed action; however, there are several areas of concern for which additional information should be provided. We therefore have assigned a rating of LO- (lack of objection) 2 (insufficient information) to the project and to the Impact Statement.

First, we must point out that according to USGS Quadrangle Map titled "Goldsboro" (1957); Basin Plans 03-04, and the North Carolina State stream classification publication, the subject creek is spelled Stony instead of Stoney.

We also note that on Page 5 Stony Creek's stream classification is referred to as Class D. Both Stony Creek and its major tributary, Howell Creek, have been upgraded to Class C by the North Carolina Environmental Management Commission on August 22, 1974. The EPA approved these revisions on November 6, 1974. Therefore, we suggest that all references to Class D be deleted.

Finally, it is stated that there are implications pursuant to Section 404 of Public Law 92-500. Therefore, a 404 permit should be sought from the U. S. Corps of Engineers and the final statement should outline measures for protecting wetlands.

We would appreciate receiving five copies of the final environmental impact statement when it is available. If we can be of further assistance in any way, please let us know.

Sincerely,

A handwritten signature in cursive script that reads "David R. Hopkins".

David R. Hopkins
Chief, EIS Branch

**Advisory Council
On Historic Preservation**

1522 K Street N.W. Suite 430
Washington D.C. 20005

January 20, 1975

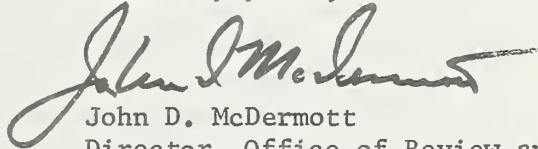
Mr. Jesse L. Hicks
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

This is in response to your request of November 15, 1974, for comments on the environmental statement for the Stoney Creek Watershed, Wayne County, North Carolina. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that your draft environmental statement appears adequate regarding our area of expertise and we have no further comment to make.

Should you have any questions or require any additional assistance, please contact Stephen Cochran of the Advisory Council staff at 202-254-3380.

Sincerely yours,



John D. McDermott
Director, Office of Review and
Compliance

North Carolina Department
of Administration

OFFICE OF
INTERGOVERNMENTAL
RELATIONS

EDWIN DECKARD
DIRECTOR

JAMES E. HOLSHOUSER, JR., GOVERNOR • BRUCE A. LENTZ, SECRETARY

January 22, 1975

Mr. W. Richard Folsche, Acting State Conservationist
United States Department of Agriculture
Soil Conservation Service
Post Office Box 27307
Raleigh, North Carolina 27611

Dear Mr. Folsche:

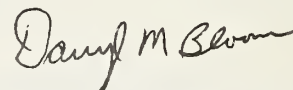
Advance Draft Plan and Draft Environmental
Impact Statement for Stoney Creek Watershed,
Wayne County, NC, Our File No. 084-74

Enclosed you will find copies of comments on the above referenced
draft plan and draft environmental impact statement from:

Department of Natural and Economic Resources
Wildlife Resources
Department of Transportation and Highway Safety
Department of Cultural Resources
Department of Human Resources

To date we have not received comments from the Neuse River Council
of Governments in New Bern, North Carolina.

Sincerely,



Darryl M. Bloom (Mrs)
Clearinghouse Supervisor

DMB:c

Enclosures

cc: Mr. J. Roy Fogle

MEMORANDUM

January 7, 1975

TO: Dee Bloom

FROM: Art Cooper



SUBJECT: CIC File No. 084-74; DEIS and Work Plan for Stoney Creek Watershed, Wayne County, N. C. ; Soil Conservation Service, USDA

The North Carolina Department of Natural and Economic Resources has reviewed the subject documents and offers the following comments on the draft EIS:

1. There is no specific mention of any relationship between land treatment measures and protection of the three reservoirs from sedimentation. It is our understanding that SCS has a requirement that 75% of the critical erosion areas above structures be adequately treated before project completion. The only reference to critical areas in the DEIS is that three acres of critical area planting will be carried out at some point during the project (page 2, DEIS). This item warrants further clarification in the final EIS.
2. On page 10 it states that "(p)ermanent pool areas of structures will be clear-cut of all vegetation to within one foot of ground level," and that "(a)ll vegetation within the embankment, emergency spillway, and borrow areas will be removed by clear cutting and grubbing where needed." This "(v)egetative material will be buried in the reservoir area below the permanent pool elevation."

It is the opinion of the Water Quality Branch of this agency that vegetative material should be removed from the reservoir site or burned, rather than buried in order to avoid increased oxygen demands on the reservoir that may result from the buried vegetative material. Such oxygen demands could result in water quality degradation in the reservoirs.

January 7, 1975

3. On page 10, it is proposed that, an ungated orifice be installed two feet below the crest of the riser in each of the structures to assure the release of an amount of water equivalent to the seven-day, ten-year minimum flow. It would appear that during a protracted period of low stream flow and high evaporation losses, water levels in the reservoirs could get so low that the orifices would not serve their expected purposes. This possibility should be carefully checked before construction, and the orifice relocated if necessary to insure the required discharge.
4. Page 26, Recreation Resources - Recreation activities in the watershed are described and visitation shown. There could have been added information showing that the unmet needs in the county (mostly Goldsboro) are 21 acres of neighborhood emphasis areas, 7 acres of community emphasis areas and 132 acres of city parks. (These data are available as backup to SCORP, 1973.)
5. On page 27, the first paragraph "describes availability of recreation facilities in the county as high." The State Comprehensive Outdoor Recreation Plan (SCORP) 1973 back-up data shows unmet needs as: 160 acres of Class I sites, 2,324 acres of Class II sites, and 24,927 acres of Class III sites. This suggests that recreation facilities should be described as moderate to low.
6. Page 33 quotes a need for 9,225 acres of General Outdoor Recreation sites. The figure is correct but reservoir water cannot contribute to all type sites within this classification. Reservoirs can contribute to the unmet needs of the county for District Parks, (51⁹ acres), county parks, (3,935 acres) and SORA-Medium (4,227 acres).
7. Page 40, recreation visitation to the three reservoirs is stated as 22,340 per year. Considering how near they are to the residential and the built-up areas of Goldsboro, the estimates appear low (or they may be based on what the minimal facilities can handle). There would have been advantages to expanding the facilities being provided.

The above comments are offered for the consideration of SCS. Overall, it is the opinion of DNER that the draft environmental impact statement is comprehensive and objective in its presentation of the anticipated environmental impact of the proposed project. Furthermore, DNER feels that this project is a well planned and worthwhile undertaking and definitely warrants implementation in the near future.

Memorandum to Dee Bloom

Page 3

January 7, 1975

One additional comment which warrants mention pertains to the protection of the reservoirs from future environmental disruption. The area surrounding the lakes will come under increasing pressure for urban development due to the attractiveness of the waterfront land for home building sites. It is important that the local governments involved recognize this and understand that increased development may result in adverse environmental effects in the form of increased sedimentation, increased run-off from impervious surfaces constructed and loss of wildlife habitat. Therefore, the local government should either purchase additional lands around the lakes for the purpose of conservation and recreation and/or restricting the use of this area by zoning to avoid high-density development. Although we recognize that this is not within the realm of SCS activities and that any such actions must be through the initiative of local government. However, it might be appropriate for SCS, if it has not already done so, to make local government officials of Goldsboro and Wayne County aware of the necessity to protect lands surrounding the reservoirs.

Attached are the complete comments of the N. C. Wildlife Resources Commission.

Attachments

cc John Wells

Page Benton

Sam Taylor

Berry Williams

Frank Barick



State of North Carolina
Wildlife Resources Commission
RALEIGH, N. C. 27611

December 13, 1974

ANDERSON, NEWLAND
ARMAN
E. CASE, HENDERSONVILLE
K. HOOKS, WHITEVILLE
L. HONEYCUTT, LOCUST
THAN T. MOOSE, WINSTON-SALEM

CLYDE P. PATTON, RALEIGH
EXECUTIVE DIRECTOR
ROSCOE D. SANDLIN, JACKSONVILLE
JAY WAGGONER, GRAHAM
V. E. WILSON, III, ROCKY MOUNT
O. L. WOODHOUSE, GRANDY

Mr. Jesse L. Hicks
State Conservationist
United States Department of Agriculture
Soil Conservation Service
Post Office Box 27307
Raleigh, North Carolina 27611

Dear Mr. Hicks:

We have reviewed the Stoney Creek Watershed Draft Work Plan and Draft Environmental Statement which accompanied your memorandum to Mr. Patton under date of November 15.

We were impressed during this review with the evolution of project plans since they were first proposed some ten years ago. The modifications made during the intervening period certainly emphasize the fact that many conflicts of interest inherent in watershed development are susceptible to reconciliation through compromise.

The Stoney Creek Watershed Plan as now proposed apparently still provides an acceptable degree of downstream flood protection even though it falls short of that which the original plan would have assured. In return for the decreased flood protection, however, is a material reduction in the area of wildlife habitat to be destroyed plus the provision of an aesthetically pleasing natural stream in the greenway instead of a precisely engineered ditch.

Insofar as Commission interests are concerned, the Stoney Creek project as currently designed, in effect, swaps 300 acres of rural mixed hardwoods and pine wildlife habitat -- plus an additional 300-plus acres subject to intermittent flooding -- for 219 acres of permanent and manageable recreation flatwater plus 100 acres of farmland managed for wildlife. In our opinion, this is an acceptable trade-off for the flood control benefits assured to the Goldsboro area. There is no critical shortage of the mixed hardwoods and pine type wildlife habitat involved in this project.

December 13, 1974

We noted at several places in the Environmental Statement that the loss of timber production on the 300 acres of woodland to be permanently flooded by the reservoir pools is implied, but nowhere among the project costs has this loss been evaluated. Even if a modest annual income of \$20. per acre from timber sales is foregone as a direct consequence of constructing the project reservoirs, a sizeable total sum is involved. Seemingly, this sum should be included among the annual costs of the project.

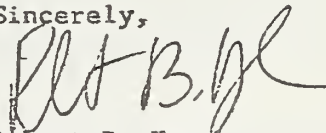
As further comment, we recommend that the clearing and snagging operation over Reaches IIA and III disturb the stream bed as little as possible below the present low-flow elevation so that some essentials of the fish habitat can be maintained.

The Commission also recommends that definite provisions for a continuing program of reservoir fish management be incorporated in the final Work Plan Agreement. The statement is made on page 10 of the Watershed Work Plan that a fish management program will be followed but no reference to it appears elsewhere. We mention this because the quality of fishing in the adjacent Bear Creek reservoirs reputedly has deteriorated over the past few years apparently for lack of an active fish management program. Such an eventuality should be avoided in the Stoney Creek project where water oriented recreation forms an important segment of the plans.

We found the Draft Environmental Statement quite adequate in defining the environmental impact and resource commitment of the project insofar as our interests are concerned.

We wish to thank you for the opportunity of reviewing these documents in draft form.

Sincerely,



Robert B. Hazel
Assistant Executive Director

FFF:en

cc: Dr. Arthur W. Cooper

Memorandum

Date: December 4, 1974

TO : Ms. D. Blume
Clearinghouse
Dept. of Administration

FROM : Stephen J. Gluckman *Gluckman*

SUBJECT: Advance Copy of Draft Plan and Draft Environmental Statement
for Stoney Creek Watershed, Wayne County, 084-74

An archaeological survey of the proposed project was conducted by Dr. David Phelps, East Carolina University, Greenville.

This survey revealed that no archaeological sites would be adversely affected by the project.

LEB:ph

cc: Mrs. Catherine Cockshutt
Soil Conservation Service



STATE OF NORTH CAROLINA
DEPARTMENT OF HUMAN RESOURCES

JACOB KOOMEN, M.D., M.P.H.
DIRECTOR

ROBERT HOLSHOUSER, JR.
GOVERNOR

DAVID T. FLAHERTY
SECRETARY

Division of Health Services

P. O. Box 2091

Raleigh 27602

December 4, 1974



Mr. Howard Ellis
Planning & Management
Division of Health Services
N. C. Department of Human Resources
Raleigh, North Carolina 27602

Re: File No. 084-74
Stoney Creek Watershed Work Plan
Wayne County, North Carolina

Dear Mr. Ellis:

This proposed plan has been prepared and submitted by the Soil Conservation Service for the Stoney Creek Watershed located in Wayne County, North Carolina.

This agency has previously reviewed this plan on two occasions and has prepared comments regarding certain specific considerations that should be made in the development of this program. The area under consideration was at one time a malaria problem area and any alterations to the streams in this area either by channelization or clearing and snagging should be given careful consideration. The plans specify that the spoil from stream clearance shall be placed in such a manner as to alleviate potential blockage of natural drains and these recommendations should be strictly adhered to.

The construction of the impoundments plan for this program shall be in accordance with the requirements of the Impounded Water Regulations of the Division of Health Services.

Sincerely,

James F. Stamey
Assistant Chief
Sanitary Engineering Section



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
RALEIGH 27611

December 9, 1974

DIVISION OF HIGHWAYS

ES E. HOLSHOUSE, JR.
GOVERNOR

TROY A. DOBY
SECRETARY

MEMORANDUM TO: Mr. W. M. Ingram, PE
FROM: C. R. Edgerton, PE *CRE*
SUBJECT: Draft Plan and Draft Environmental Impact
Statement for Stoney Creek Watershed, Wayne County,
N. C., File No. 084-74

Subject material has been reviewed. This will be a beneficial project insofar as roads in the area are concerned. Minor adjustments will have to be made to several roads when the project is accomplished. Responsibility for this will be defined by agreement between the sponsors of the watershed project and the Division of Highways at the proper time. In the improvement to US 70 Dab. several years ago, the bridge over Stoney Creek was constructed to accommodate the proposed watershed project improvement at this location.

The material furnished for review is returned herewith.

CRE:t
att.

cc: Mr. John H. Davis
Mr. M. S. Howell

AGRICULTURAL EXTENSION SERVICE

NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

January 13, 1975

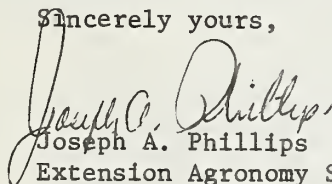
AGRICULTURE EXTENSION SERVICE
AGRONOMY SPECIALIST
BOX 5155
RALEIGH, N. C. 27607

Mr. Jesse Hicks
State Conservationist
Soil Conservation Service
P. O. Box 27307
Raleigh, N. C. 27611

Dear Mr. Hicks:

I have reviewed the advance copies of the draft plan and the draft environmental impact statements of both the Country Line Creek Watershed, Caswell and Rockingham Counties, North Carolina, and for Stony Creek Watershed, Wayne County, North Carolina. Both documents for the two watersheds appear to be in good shape; therefore, I do not have any comments before the final environmental impact statements are made. However, I appreciate the opportunity to review the watershed drafts and if I can be of further assistance in the future, please feel free to call upon us.

Sincerely yours,


Joseph A. Phillips
Extension Agronomy Specialist

JAP:gw

cc: Dr. George Hyatt, Jr.



COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS. NORTH CAROLINA STATE UNIVERSITY AT RALEIGH, 100 COUNTIES AND U. S. DEPARTMENT OF AGRICULTURE COOPERATING



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

In Reply Refer To:
PEP ER-74/1422

FEB 10 1975

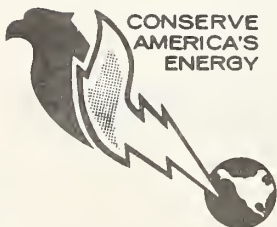
Dear Mr. Hicks:

Thank you for your letter of November 15, 1974, requesting our views and comments on the draft environmental statement and watershed work plan for the Stoney Creek Watershed, Wayne County, North Carolina. Comments on both documents are presented below.

Work Plan

The Fish and Wildlife Service report of June 12, 1969, described the biological resources in the Stoney Creek Watershed. At that time, proposed structural works included 10.2 miles of stream channelization and four floodwater-retarding structures (structure numbers 2, 3, 4, and 39). Project plans have been revised to delete the 10.2 miles of stream channelization and floodwater-retarding structure number 4. These revisions in the work plan have resolved most of the Fish and Wildlife Service concerns expressed in the 1969 report. However, we feel that the fish management plan described in the addendum to the draft work plan should be more specific. We note that the establishment of a warm-water fishery for an average of 61 fishermen per day, or 22,340 visitors annually, figures prominently in the computation of project benefits. To achieve these benefits, we feel that an effective fish management plan is imperative since the resultant fishery would be somewhat marginal at best, even with proper management. Therefore, a fish management plan for the three reservoirs should be described in the work plan.

The draft work plan states that snagging and clearing will consist of removing channel debris, log jams, and adjacent trees leaning over the channel at an angle of 30 degrees or more, and that this work will be done with small, light construction equipment. We recommend that this project feature include a minimum of streambed and streambank cover disturbance and destruction, and that the work plan describe the clearing and snagging procedures to be employed.



Save Energy and You Serve America!

The location map at the back of the report shows that the upper half of the basin has "drainage" problems. We assume this problem results from a high water table which causes water to stand on the surface for short periods following rains. If there are drainage problems in the upper part of the basin now, the three proposed reservoirs will make it considerably worse. This subject should be addressed in the work plan and impact statement.

In addition to the three reservoirs mentioned above, it is proposed to improve 2.1 miles of channel below the reservoirs. Item V on the Summary Sheet indicates that the project will reduce urban flood damages by \$52,470 annually. However, the aerial photograph contained at the back of the report shows that only a few houses are located in 100-year flood plain and the width of this area is not greatly affected by the project. Both the damage figures and annual savings appear to be greatly exaggerated; the figures should be substantiated.

We note that, on page 30, the estimated value of the property affected by flooding is \$1,069,000. The total cost of the project is \$1,541,579. In view of the aggravated drainage problem upstream from the reservoirs it would appear that one alternative course of action, which we suggest should be considered in this statement, would be for the Federal government to buy the floodplain.

Areas below the channel improvements that will benefit are shown on the project map. If the channel clearing serves its intended purpose, it would seem that the downstream areas would be adversely affected. Why this is not the case, it is not clear and further explanation is warranted.

This report emphasizes in several places erosion and sediment damages (see, for example, p. 31-32). The rate of erosion given on page 31 is 6.1 tons/acre/year or 3,900 tons/mi²/year are delivered to the mouth. We do not have any sediment data for Stoney Creek but we do have data for Nahunta Swamp (Creek) which borders the Stoney Creek Watershed on the north. Our data show sediment runoff of 60 tons/mi²/year or about one-twentieth the value given. These sediment run-off estimates should be substantiated. Furthermore, if these estimates can be substantiated, they suggest that proposed reservoirs will have a very short life.

Draft Environmental Statement

Known mineral resources of Wayne County include marl, sand and gravel, and poor quality slate. Of these, only sand and gravel is currently being produced. Sand and gravel and marl are found within the project area, but there is no mineral production within the project limits.

The affected mineral resources are common and widespread throughout the coastal plain of North Carolina; as a result, the proposed project should have no significant effect upon availability or supply, although this is not specifically stated in either the work plan or the environmental statement.

Project modifications have removed most of the objectionable environmental effects. The project now involves the conversion of 219 acres of mixed hardwoods and pine to impounded water in the permanent pools of the three reservoirs. Approximately 80 acres will be required for the construction of dams, spillways, and access areas. These reservoirs can provide new warm-water fishing opportunities if they are managed properly. Downstream areas will be affected by clearing and snagging, increased turbidity, and reduction in overbank flooding.

The statement that, "Upland game areas available for hunting will not be affected by the project except during the period when parts of the 319 acres of flood pool will be inundated..." page 39, paragraph 4 is incorrect. It is amply documented in both the draft environmental statement and draft work plan that 219 acres of forest land will be permanently lost. Hunting opportunities will also be lost or greatly curtailed in the 80 acres required for the dams, spillways, and access areas. On page 10 of the addendum to the draft work plan, it is stated that no hunting will be allowed in the reservoir area, except on a controlled basis, as determined by the North Carolina Wildlife Resources Commission. Therefore, future hunting opportunities in the 319 acres of flood pools are uncertain. In addition, there is no reference as to whether waterfowl hunting will be permitted in the lakes.

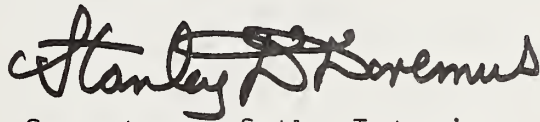
On page 47, paragraph 1, (Irreversible and Irretrievable Commitments of Resources), in addition to the 219 acres of forest land, approximately three miles of aquatic stream

habitat will be permanently inundated by water in the three reservoirs. Thus, these stream sections will no longer provide habitat for stream-dwelling fishes and benthic organisms and associated wetland wildlife species. Similarly, the somewhat limited stream fishing opportunities now provided by these stream sections will be lost.

Potential impacts related to geologic conditions are adequately discussed in the environmental statement.

We hope these comments will be of assistance to you in preparing your final document.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Stanley B. Foreman". The signature is written in a cursive, somewhat stylized script.

Deputy Assistant Secretary of the Interior

Mr. Jesse L. Hicks
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 27307
Raleigh, North Carolina 27611

