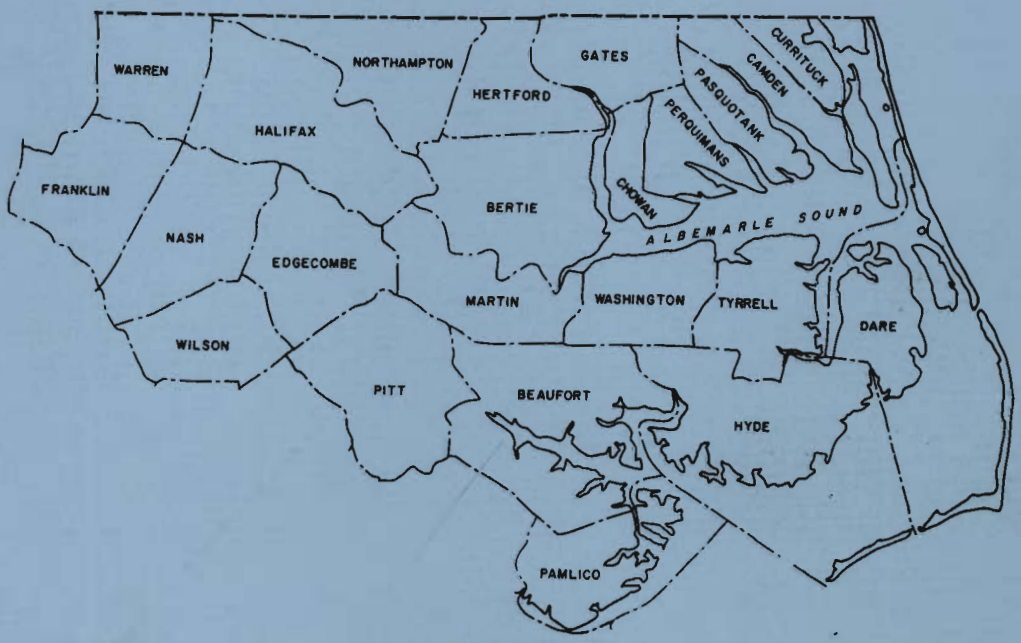
STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

PUBLIC WATER SUPPLIES OF NORTH CAROLINA



Part 4
NORTHERN COASTAL PLAIN

By

T. M. Robison

Prepared by

United States Department of the Interior
Geological Survey
In Cooperation with the
North Carolina Department of Natural and Economic Resources

Raleigh, N.C
JANUARY 1977

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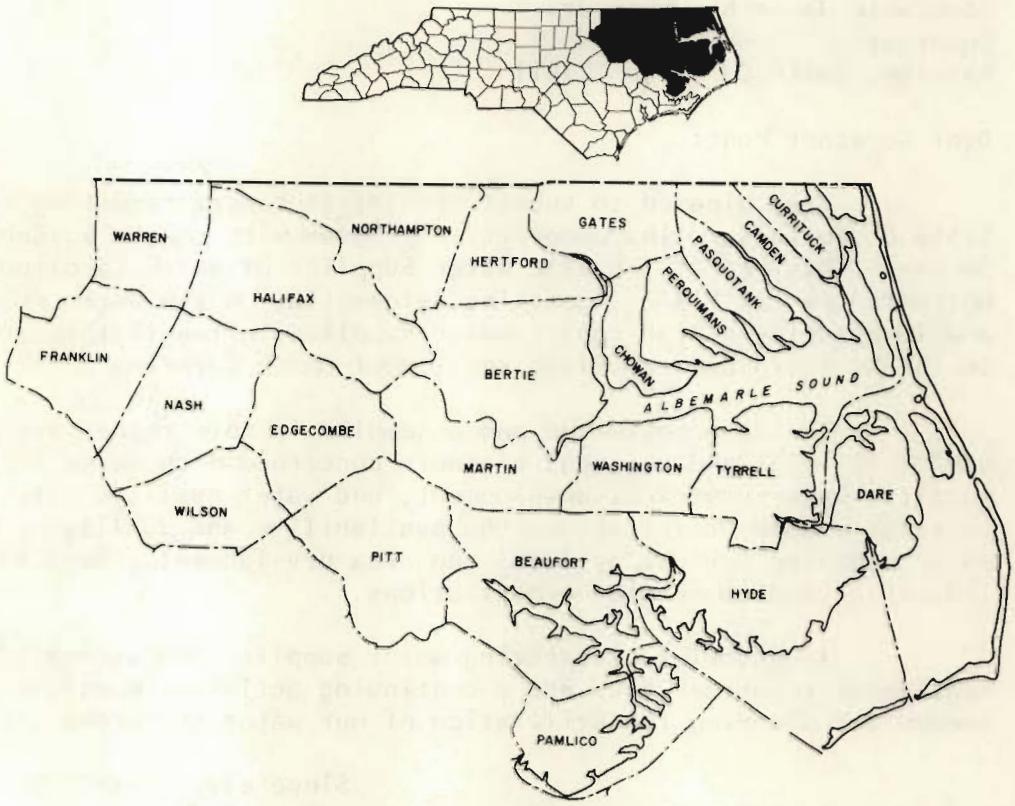

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JAMES B. HUNT, JR., GOVERNOR . HOWARD N. LEE, SECRETARY

DIVISION OF ENVIRONMENTAL MANAGEMENT

BOX 27687, RALEIGH 27611
TELEPHONE 919 733-4740

May 1, 1977

Honorable James B. Hunt, Jr.
Governor
Raleigh, North Carolina 27611

Dear Governor Hunt:

I am pleased to submit the latest report resulting from the State of North Carolina cooperative program with the U. S. Geological Survey. This report, "Public Water Supplies of North Carolina, Part 4, Northern Coastal Plain", contains information on the water resources and inventories of the public water supplies in twenty three counties in the Northern Coastal Plain section of North Carolina.

The data collected and assembled in this report are especially useful to local and regional planners concerned with water-supply availability, water-resources development, and water quality. It will also serve as a handy reference on the availability and quality of municipal water supplies for use by local and area development groups and for industrial and commercial organizations.

Inventories of existing water supplies and assembly of pertinent water resources data are a continuing activity to assure that data needed for planning the utilization of our water resources are available.

Sincerely,

Howard N. Lee

Attachment

PUBLIC WATER SUPPLIES OF NORTH CAROLINA

Part 4

NORTHERN COASTAL PLAIN

By

T. M. Robison

PREFACE

Interest in data on public water supplies of North Carolina has existed for many years. In 1947 the U.S. Geological Survey prepared Progress Report 1 on public supplies derived from surface-water sources and in 1949 Progress Report No. 2 on the public supplies derived from ground-water sources; both reports resulted from cooperative studies with the North Carolina Board of Health. In 1961, Bulletin 2 of the North Carolina Department of Water Resources titled, "Chemical and Physical Character of Municipal Water Supplies in North Carolina" was published. This Bulletin reported the results of chemical analyses and rather brief information on source and pumpage or consumption of the water supplies of 324 cities and towns in North Carolina. The work was done by the U.S. Geological Survey in cooperation with the North Carolina Department of Water Resources. From 1961 to 1965 three supplements to Bulletin 2 were prepared under the continuing cooperative agreement to include new chemical analyses and changes in public water supplies. In 1969 all the data collected between 1960 and 1965 were published in Bulletin 3.

The rather brief information collected under these programs was determined to be inadequate to meet long-range planning needs. Accordingly, the program has been enlarged to include a complete inventory and general comments on present and potential development of all public water supplies in North Carolina with 500 or more customers.

The enlarged scope of the program and fund limitations preclude collection and timely release of data on all water supplies in one volume. Therefore, the State has been divided into five areas, with approximately 60 public water systems in each. The division was made along county boundaries and is shown on the map in figure 1.

Inventory data on the public water supplies in each area have been collected and are being published, in one volume on each area, at the rate of one volume annually.

This volume contains data on the northern Coastal Plain, the fourth area to be studied.

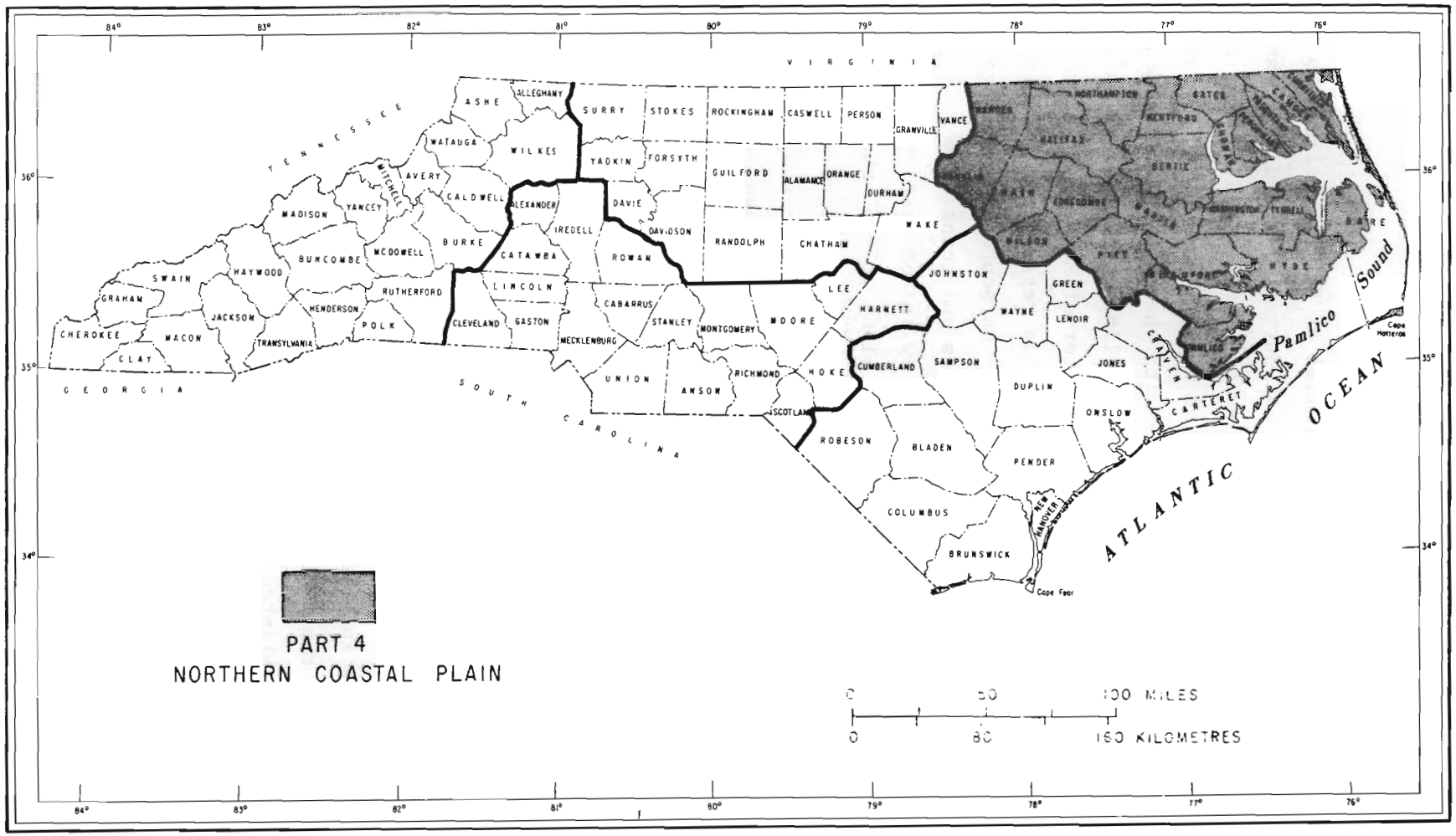

Figure 1.--Map of North Carolina showing how the State was divided for the public water-supply inventory.

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ILLUSTRATIONS

CONVERSION FACTORS TO INTERNATIONAL SYSTEM UNITS

For use of those readers who may prefer metric units rather than English units, the conversion factors for the terms used in this report are listed below:

Multiply English unit	by	to obtain metric unit
inches (in)	25.40	millimeters (mm)
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
square miles (mi^2)	2.590	square kilometers (km^2)
gallons (gal)	3.785	liters (l)
gallons per minute (gal/min)	.0631	liters per second (l/s)
million gallons per day (Mgal/d)	.0438	cubic meters per second (m^3/s)
million gallons per day per square mile [(Mgal/d)/mi^2]	.0169	cubic meters per second per square kilometer [(m^3/s)/km^2]
acre-feet per square mile (acre-feet/mi^2)	476	cubic meters per square kilometer (m^3/km^2)
cubic feet per second per square mile [(ft^3/s)/mi^2]	.0109	liters per second per square kilometer [(l/s)/km^2]

PUBLIC WATER SUPPLIES OF NORTH CAROLINA

PART 4

NORTHERN COASTAL PLAIN

T. M. Robison
U. S. Geological Survey

ABSTRACT

This report contains information on the water resources and the larger public water supplies in 23 counties in the northern Coastal Plain Section of North Carolina useful to planners and water managers concerned with water-supply availability, water-resources development, and water quality.

The report is divided into two sections. The first describes the method of investigation, an explanation of the information reported for each water supply and its significance to planning, a discussion of the chemical analyses included in the report, and a discussion of some of the problems noted during the investigation. The second includes a water-resources appraisal and a map of each county showing the general area served by public water supplies and an inventory of each public supply in the county with 500 or more customers that gives: (a) the population served, (b) the adjacent communities served, (c) the number of customers, (d) the source of water, (e) estimated allowable draft, (f) total and industrial water use, (g) raw- and finished-water storage, (h) raw- and finished-water pumping capacity, (i) future plans, (j) a water-resources appraisal in the immediate vicinity of the supply and, (k) the results of chemical analyses of raw and finished water.

INTRODUCTION

North Carolina is a water-rich State. The municipal water systems of the State have done an excellent job of supplying their customers with an adequate supply of safe water. Occasionally, water use has been curtailed during very dry years, but these instances have been relatively rare. To maintain this fine record, local managers should continuously evaluate their water systems, should anticipate future requirements, and should plan and pursue any required expansion. Even though the State is water-rich, the supply is not limitless. Regional planners should insure that the available water resources are properly developed and wisely used.

To aid in the planning, development, and utilization of the municipal supplies in the State, an inventory of the municipal water supplies in North Carolina with 500 or more customers was undertaken in 1970 as a part of the cooperative program between the North Carolina Office of Water and Air Resources, now the North Carolina Department of Natural and Economic Resources, and the U. S. Geological Survey.

Planning to meet future water requirements is a continuous job and oftentimes a frustrating one. The population growth, industrialization, and water requirements have to be projected into the future. The yield of the source(s) of water must be estimated. From these projections and estimates would come the plans to insure a safe, dependable water supply. Implementation of plans can be frustrated by a lack of financing. Only when water managers do a poor job are they recognized, because no one thinks about water until there is a shortage.

This report is the fourth of a series of five reports, each of which will contain information on approximately one-fifth of the municipal water supplies in the State. Data on the municipal systems in Part 4 were collected from June 1974 to April 1975.

Information is reported on a county basis and includes a general appraisal of the surface-water and ground-water resources, a map showing the approximate area served by municipal systems, an inventory of each municipal system with 500 or more customers, and results of chemical analyses of samples of the raw and finished water from each water system.

The surface-water appraisals contain information on streams draining the county, including estimates of average and minimum flows. The ground-water appraisals include a summary of the ground-water conditions, data on reported well depths and yields, and a general statement on the chemical quality of ground water.

The inventory of the municipal system in each county includes information on the population served, source of supply, raw- and finished-water storage, estimated allowable draft, total use, industrial use, pumping capacity, treatment and treatment capacity, and an appraisal of the surface-water and ground-water resources in the immediate vicinity of the municipality.

The results of chemical analyses include the results of an analysis of the chemical constituents most commonly found in water, a standard complete analysis, and an analysis for a selected group of minor elements.

This report also includes a discussion of the method of investigation, brief descriptions of water-treatment processes, the significance of the data as related to planning, and general comments concerning problems noted.

COOPERATION AND ACKNOWLEDGMENTS

The study of the public water supplies in North Carolina is being made by the U. S. Geological Survey in cooperation with the Division of Environmental Management, North Carolina Department of Natural and Economic Resources. The inventory data were reviewed by personnel of this Department and by the Division of Health Services of the North Carolina Department of Human Resources. Needless to say, most of the data contained in this report could not have been collected without the generous cooperation of municipal officials and engineering consultants, who supplied information on the water-supply installations.

This report is published by the North Carolina Department of Natural and Economic Resources in the interest of making the information available to all concerned with the development and utilization of municipal water supplies in the State.

METHOD OF INVESTIGATION

Each municipality in the northern Coastal Plain section of North Carolina with 500 customers or more was visited by hydrologists of the U. S. Geological Survey. The purpose of these visits was to obtain data on the major components of the water system and to collect water samples for chemical analysis. Where possible, consulting engineers for the individual system were visited to obtain additional information, and available water system appraisal reports by consultants were reviewed. The general appraisal of the surface-water and ground-water resources in each county and in the vicinity of each municipality was made largely on the basis of information in published reports or in the files of the Geological Survey.

The collection of streamflow data and the study of streamflow characteristics is a continuing activity of the Geological Survey. Streamflow data in this report were developed from streamflow records collected at more than 2,500 sites in the State. Extensive use was made of a report prepared by Goddard (1963) which contains data on average discharge, flow-duration, low-flow frequency, and draft-storage frequency based on streamflow records collected through 1956. The results of similar studies based on additional records collected since the publication of Goddard's report were also used in making the surface-water appraisals.

Appraisals of ground-water conditions of counties and municipalities were based on reports of reconnaissance ground-water investigations published in a series of State-published bulletins having the general title "Geology and Ground Water Conditions in the _____ area North Carolina." Figure 2 is an index map of North Carolina showing locations of reconnaissance ground-water investigations. The purpose of these investigations was to compile data on the ground-water resources, including data on use, availability, chemical quality, and geologic controls of ground water.

Ground-water appraisals depend largely upon a knowledge of the hydrogeologic conditions of the locality. Previous investigators have divided the State into five hydrogeologic areas. These areas, as modified for this report, are shown on figure 3. A hydrogeologic cross-section showing the aquifers underlying the hydrogeologic areas covered in this report is given on figure 4. The "upper sandy aquifer" comprises the rocks of post-Miocene, late Miocene, and middle Miocene age of Brown, Miller, and Swain (1972); the

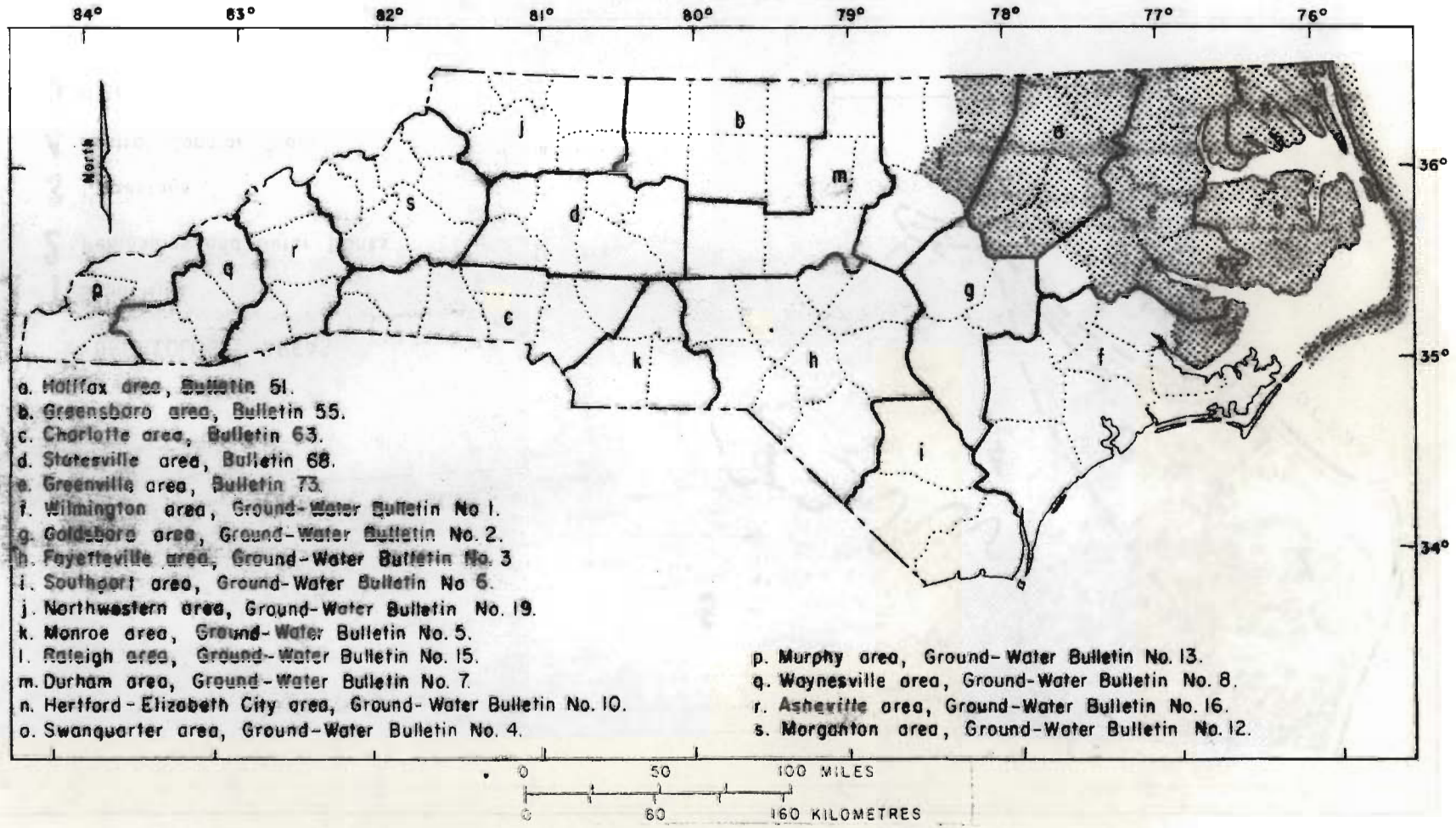

Figure 2.--Map of North Carolina showing areas covered by reconnaissance ground-water investigations. Shaded area is part 4.

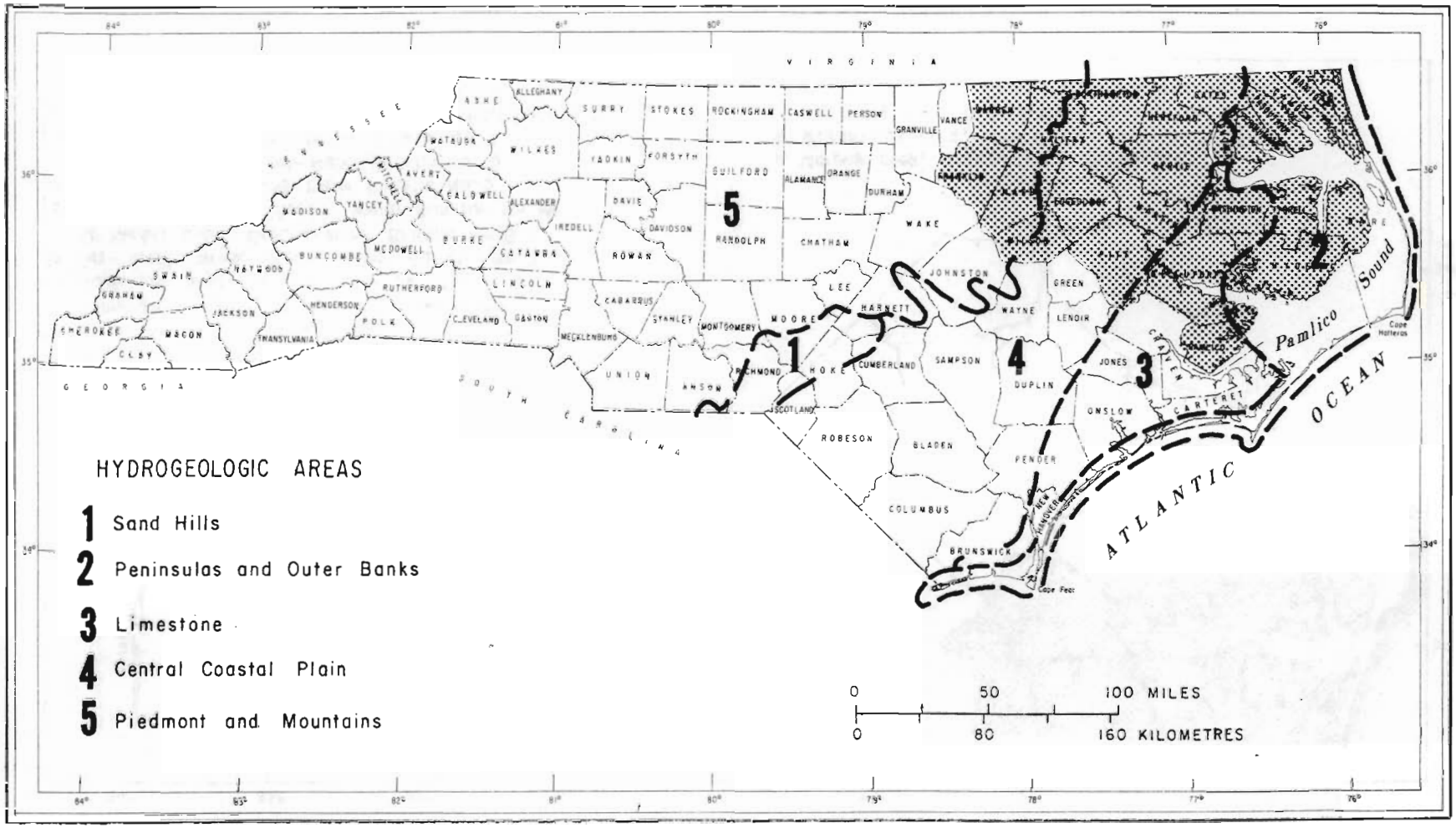

Figure 3.--Approximate boundaries of the five hydrogeologic areas in North Carolina described in the report.

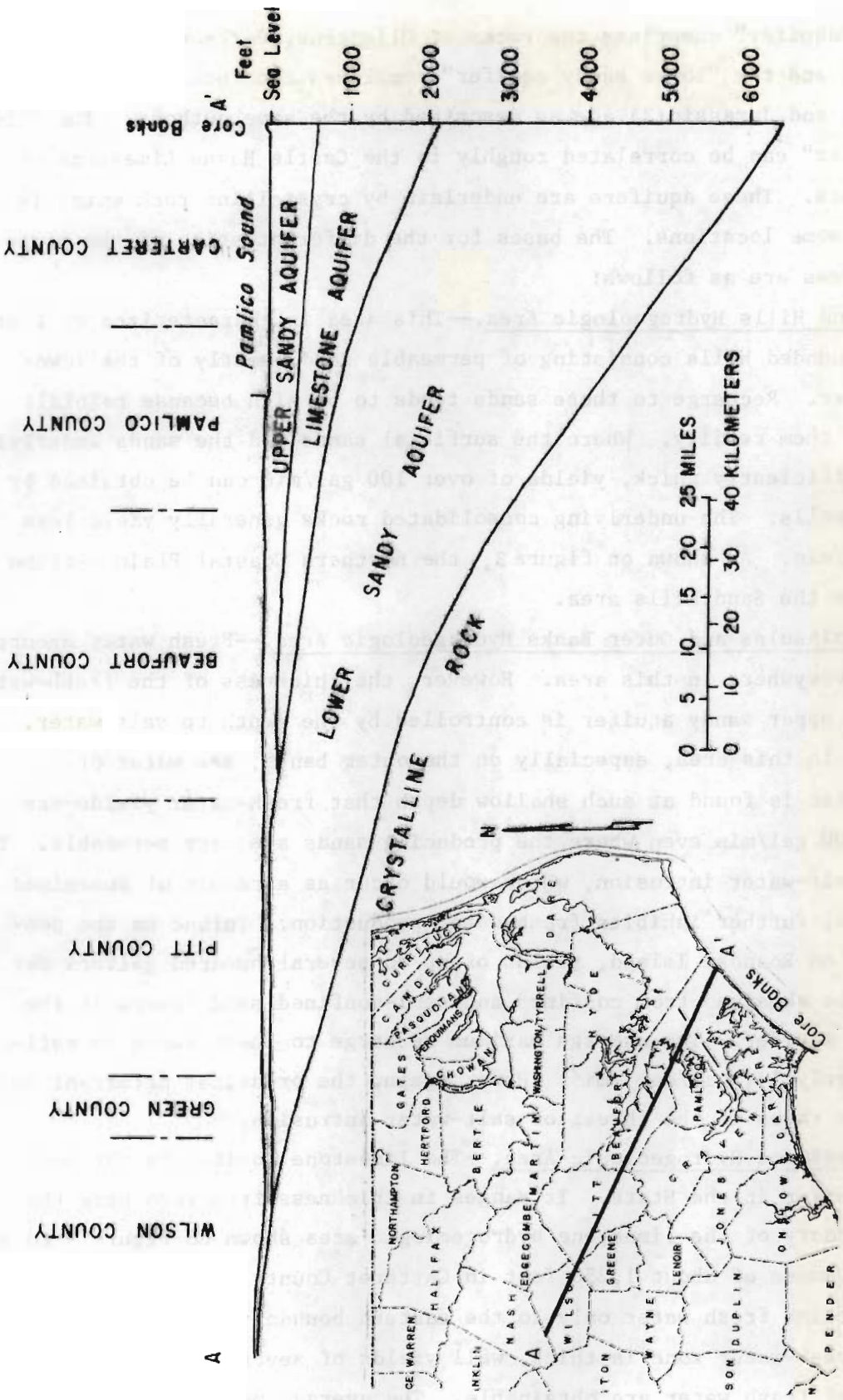

Figure 4.--Generalized cross-section showing the major aquifers in the North Carolina Coastal Plain region.

"limestone aquifer" comprises the rocks of Oligocene, Jackson, Claiborne, and Sabine age; and the "lower sandy aquifer" comprises the rocks of Midway, Cretaceous, and Jurassic(?) age as described by the same authors. The "limestone aquifer" can be correlated roughly to the Castle Hayne Limestone of other authors. These aquifers are underlain by crystalline rock which is an aquifer in some locations. The bases for the differentiation of the hydrogeologic areas are as follows:

1. Sand Hills Hydrogeologic Area.--This area is characterized by flat-topped to rounded hills consisting of permeable sand, mostly of the lower sandy aquifer. Recharge to these sands tends to be high because rainfall infiltrates them readily. Where the surficial sands and the sands underlying them are sufficiently thick, yields of over 100 gal/min can be obtained by individual wells. The underlying consolidated rocks generally yield less than 50 gal/min. As shown on figure 3, the northern Coastal Plain section lies outside the Sand Hills area.

2. Peninsulas and Outer Banks Hydrogeologic Area.--Fresh water occurs virtually everywhere in this area. However, the thickness of the fresh-water zone in the upper sandy aquifer is controlled by the depth to salt water. In most places in this area, especially on the outer banks, sea water or brackish water is found at such shallow depth that fresh-water yields are less than 100 gal/min even where the producing sands are very permeable. The threat of salt-water intrusion, which would occur as a result of sustained high pumpage, further inhibits fresh-water production. Inland on the peninsulas and on Roanoke Island, yields of up to several hundred gallons per minute can be obtained from confined and semi-confined sand layers in the upper sandy aquifer. The average maximum recharge to these sands is estimated at nearly 1 (Mgal/day)/mi^2. Here, again, the principal deterrant to high pumpage rates is the threat of salt-water intrusion.

3. Limestone Hydrogeologic Area.--The limestone aquifer is the most prolific aquifer in the State. It ranges in thickness from zero near the western boundary of the limestone hydrogeologic area shown on figure 3 to a maximum thickness of about 1,250 feet in Carteret County. However, the aquifer contains fresh water only to the eastern boundary shown on figure 3. Where the fresh-water zone is thick, well yields of several thousand gallons per minute of fresh water are obtainable. The average maximum recharge that can be induced to this aquifer is estimated to be 0.63 (Mgal/day)/mi^2. The

relation of this aquifer to the other aquifers in the area is shown on figure 4.

4. Central Coastal Plain Hydrogeologic Area.--This area is underlain by moderately permeable sands interbedded with less-permeable silts and clays. These deposits thicken eastward from the Piedmont area. Here, the thin surficial deposits of the upper sandy aquifer lie directly upon the lower sandy aquifer. The lower sandy aquifer contains only a relatively small amount of fresh water east of the boundary between this area and area 3.

Although the Central Coastal Plain deposits have a much lower average permeability than the limestone aquifer, they have an aggregate thickness in some places that permits well yields of over 1,000 gal/min of fresh water. However, the maximum recharge that can be induced to the deeper parts of these deposits is estimated to range from 0.007 to 0.06 $(Mgal/day)/mi^2$. With such a small potential recharge it is desirable to space production wells adequately in order to minimize well interference.

5. Piedmont and Mountain Hydrologic Area.--In the Piedmont and Mountain section, ground water is stored between the individual grains in the soil and weathered rock and in the fractures of the underlying crystalline bedrock. Simply speaking, the saturated spaces in the soil form a reservoir of stored water, and the bedrock fractures serve as pipe lines tapping the reservoir. Therefore, the best wells are usually those drilled where the overlying soil is thickest and the bedrock contains numerous fractures. The locations of fractures or the exact thickness of the soil cover are impossible to determine without drilling a test hole. However, an examination of the surface features and a knowledge of the type of bedrock underlying the area greatly improves the chance of drilling a successful well. For a more complete discussion see "Ground Water of the Piedmont and Blue Ridge Province in the Southeastern States" by LeGrand (1967).

EXPLANATION OF INVENTORY DATA

The function of a water-supply system is to produce continuously an adequate supply of water that is wholesome and palatable. A knowledge of the present and potential capacity of the various components (source, treatment plant, distribution lines) of the water system is required if water managers and planners are to insure that the water-supply systems of North Carolina will fulfill this primary function. The information collected for each water-supply system and the purpose or significance of the information, except where self evident, follows:

Ownership

The owner listed is the municipality, water association, private individual, or private company that owns and operates the water facility. Also included in this section is the approximate population supplied and the number of customers inside and outside the corporate limits.

Source

The source(s) of the raw water and location of the intake(s) are given for surface-water supplies. For ground-water supplies, the location of the wells and pertinent data on the construction and operation of the wells and the aquifer tapped are given. For some ground-water supplies, a value is listed for well yield. This is the predicted amount of water the well should yield based on a drawdown test. In contrast, pump capacity is the pumping rate of the pump on the well at the time data were obtained on the water-supply system. Well-construction data and well-operation data are generally not available. It is recommended that this information be collected and retained by all systems using wells.

Raw-Water Storage

Minimum flows of all but the largest streams are inadequate to meet the daily demand of most public water supplies, and flood waters must be stored in sufficient volume to assure a continuous supply. Storage reservoirs may be "on river" or "off river." On-river storage is created by construction of a dam on the main channel of the river, whereas off-river storage is a reservoir not on the main channel. Off-river reservoirs are normally filled by

pumping water from the stream to the reservoir. Such reservoirs are generally smaller than on-river reservoirs but have an advantage in that the water-plant operator can be selective, from a water-quality standpoint, in filling the reservoir. In places where conflicting estimates of storage were obtained, the listed storage is that considered the most reliable.

Estimated Allowable Draft

Allowable draft is the maximum rate at which water can be withdrawn continuously, either from the stream or from storage, without exhausting the supply. Draft estimates are based on minimum streamflows that can be expected to occur once in 20 years on the average. Thus, the flow of the stream or the flow supplemented by storage should provide the estimated draft rate 19 years out of 20, on the average.

All methods used to determine draft rates are based on records of streamflow. Unfortunately, many reservoirs and water intakes are on streams where no record of streamflow are available. Therefore, flow for ungaged streams was estimated using streamflow data from nearby gaged streams.

The regional relation of the 7-day, 2-year minimum flow to allowable draft developed by McMaster and Hubbard (1970), reproduced here as figure 5, was used to estimate allowable draft rates for each system.

The relation curves shown in figure 5 are averages of draft-storage frequency data published by Goddard (1963). The accuracy of draft rates computed using figure 5 depends on the scatter of the values used to determine the average curve and the accuracy of the estimate of the 7-day, 2-year minimum flow used to enter the relation. The standard errors of estimate (a measure of the scatter of the points used to define the relation curves) of the draft rates shown in figure 5 are as follows:

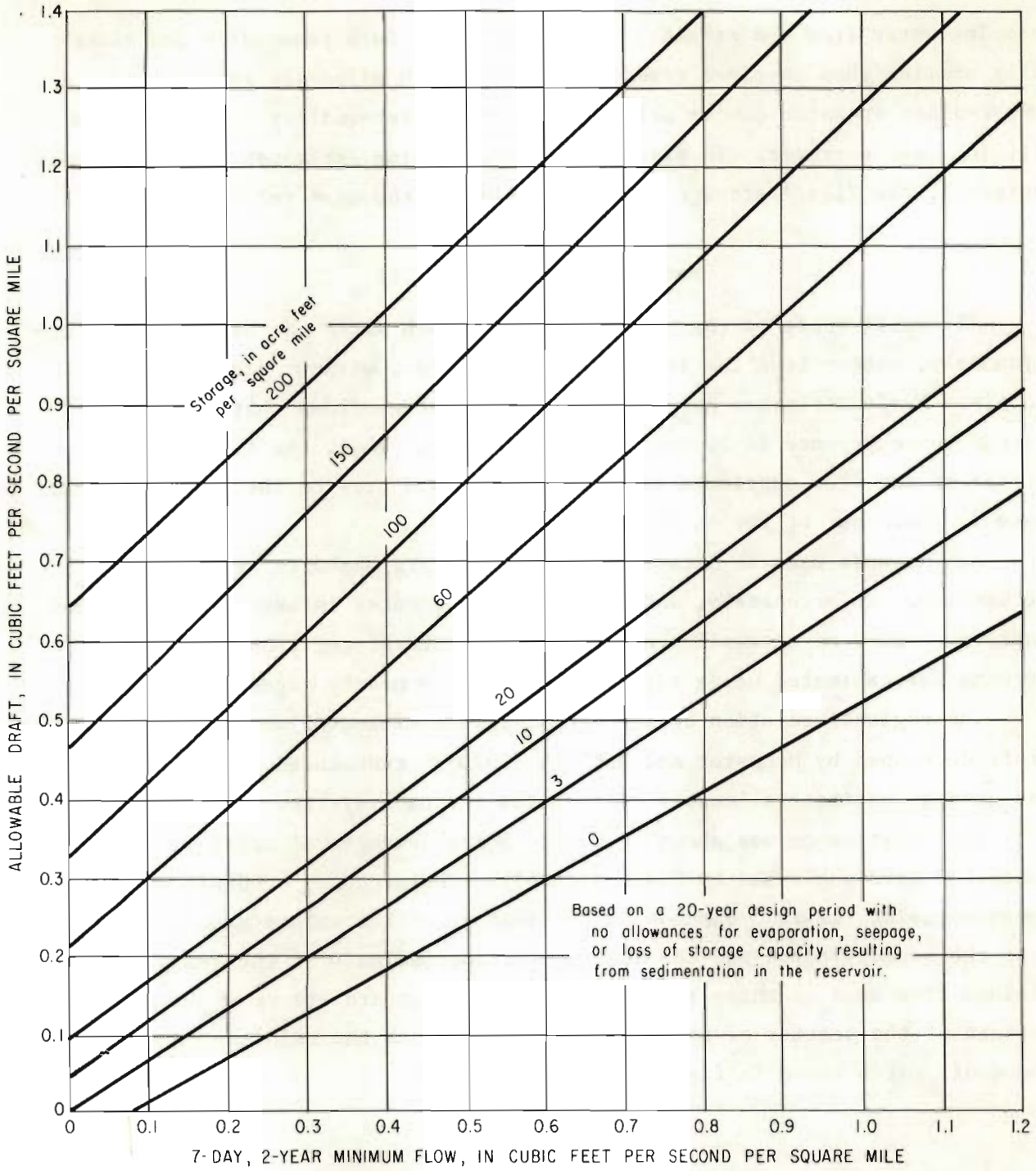

Figure 4.--Relation for estimating the allowable draft of a stream-reservoir using the 7-day, 2-year minimum flow of the stream as an index for entering the graph.

Storage (acre-feet/mi^2)	Standard error [(ft^3/s)/mi^2]
200	0.21
150	.14
100	.10
60	.07
20	.08
10	.06
3	.05
0	.05

The relation is general, and draft rates determined using the relation should be considered as planning guides only and not as exact values.

Allowable draft rates should include allowances or adjustments for evaporation, seepage, and loss of storage capacity resulting from sedimentation in the reservoir. Seepage losses or gains depend on a detailed knowledge of the type and construction of the dam and analysis of the geologic features of the reservoir, both of which are beyond the scope of this report. However, siltation rates and evaporation losses can be estimated with some certainty, and these adjustments were made, as described in the following paragraphs.

Losses due to sedimentation were estimated using data on annual loss rates for North Carolina reservoirs reported by Dendy and Champion (1969, p. 5, 6). The total loss was computed using a loss rate experienced in similar types of basins, and the time span used was from the time of the last reservoir volume determination to 1984. The volume loss thus estimated was subtracted from the reported storage before entering the relation in figure 5.

Minimum flows and maximum water demands generally coincide during the summer and early fall in North Carolina. Estimates of evaporation losses for this period were made based on the average daily land-pan evaporation during the months of August, September, and October, adjusted by a coefficient of 0.75. Evaporation data from the pan nearest each reservoir was used. A small amount of lake-evaporation data is available and was used in some evaporation estimates. Evaporation losses constitute a demand or additional draft on the source and were subtracted from the allowable draft obtained

from the regional relation. The relation shown in figure 5 is applicable only to reservoirs where within-year storage will supply the demand. For within-year storage to supply the demand, the reservoir must refill each year. Average streamflow in North Carolina is variable and the average for some years can be as little as 50 percent of the long-term average. Therefore, if the draft rate exceeds 50 percent of long-term average streamflow there would be some years when the reservoir would not refill. The water remaining in storage would be "carried-over" and would have to be sufficient, in combination with subsequent inflow, to supply the demand of the next year.

In reports on the Piedmont and mountains (parts 1 to 3 of this series), draft rates for reservoirs were not estimated when carry-over storage was involved because of the lengthy analysis then required. A report by Arteaga and Hubbard (1975) contains a simple method for determining allowable drafts when carry-over storage is involved. That report can be used for determining storage capacity of reservoirs when a need for carry-over storage is anticipated.

Total Use

Average daily use and maximum daily use are given. Water usage varies from hour to hour, day to day, and season to season. In general, the smaller the community, the greater the variation in its demand for water. Water systems, of course, must have sufficient capacity to meet the peaks in demand. The ratio of the maximum daily use versus the average daily use is one design criterion used in sizing the various components of a water system, particularly the storage component.

Industrial Use

The amount of water used by industry is estimated. These estimates are based on actual metering of the larger users plus an estimated value for smaller industrial users. Where two or more industries use a significant amount of water, they are listed.

Industrial water use often accounts for more than 50 percent of the total demand on a water supply. Obviously, a new industry, an expansion of an existing industry, a change in the manufacturing process that requires

more or less water, or the closing of an industry, can greatly affect the water needs of a community. Good planning should include an analysis of present and future industrial water requirements.

Treatment

The treatment given to each water supply is listed in this section. Some raw waters are satisfactory in quality for all municipal uses. Most, however, require disinfection and purification before they can be used. The treatment given depends on the quality of the raw water being treated. Briefly, some of the processes and their purposes that are used in water-treatment plants are as follows:

Aeration.--is a process in which water is brought in intimate contact with air for the purpose of changing the concentrations of volatile substances contained in the water. It reduces the amount of free carbon dioxide and hydrogen sulfide and supplies oxygen to those waters that are deficient in oxygen. Aeration is generally associated with iron and manganese removal and taste and odor control.

Prechlorination.--is the application of chlorine at any stage in the treatment prior to filtration. The primary purpose of chlorination is to kill disease-producing bacteria. However, prechlorination not only disinfects but also improves coagulation in those waters that contain objectionable amounts of color and iron, retards decomposition of organic matter in the coagulation basin, removes certain tastes and odors by oxidizing organic matter, and controls the growth of plants and microscopic organisms that could produce undesirable tastes and odors and reduce filter-bed efficiency.

Coagulation.--is a process that involves the formation of chemical flocs that adsorb, entrap, or otherwise bring together collodial and other finely-divided matter suspended in the water. These flocs, which resemble cotton candy, slowly settle and drag down the suspended matter.

Sedimentation.--Particles suspended in water tend to move downward under the influence of gravity regardless of size, shape, or weight. Flowing water tends to hold particles in suspension. Sedimentation is a process whereby the sediment-carrying power of flowing water is reduced by slowing the linear velocity of water until suspended matter will settle out. Coarse sediments may settle in hours, whereas fine sediments may require weeks to settle

completely. Coagulation, as outlined above, speeds the rate at which fine sediments settle.

Taste and odor control with carbon.--The two major sources of undesirable tastes and odors are: (1) decaying vegetation, live and dead algae, and bacterial slimes and (2) sewage and industrial wastes. Practically all steps in the treatment process combat undesirable tastes and odors. Activated carbon is a chemical added primarily to adsorb taste-, odor-, and color-producing substances from water supplies. After adsorbing undesirable substances, the carbon is either settled or filtered out.

Filtration.--is the act of passing the water through a porous material in such a manner as to effectively remove suspended matter. A filter is, in essence, a strainer that physically traps the suspended material. The porous material (filter media) consists of one or more layers of gravel, sand, carbon, anthracite, or coke. The standard gravity filtration rate per square foot of filter area is 2 gallons per minute. Pressure filtration rates may be much higher.

Softening.--Hard water can be softened by the use of natural or artificial base-exchange media called zeolites. In this process, the hardness-causing calcium and magnesium ions in the water are replaced by sodium ions.

Corrosion control.--The objectives of corrosion control are: (1) to increase the life of the distribution system, (2) to decrease pumping costs, and (3) to protect the potability of the water. The most popular method of control is the addition of sodium hexametaphosphate in the treatment process. It is not entirely clear how polyphosphate conditioners operate, but the current theory is that a thin, protective film is deposited over the pipe's inner surface. Polyphosphates such as sodium hexametaphosphate also will hold iron and calcium in solution.

Probably the most effective method of controlling corrosion is either physically coating iron pipes with a protective coating, such as cement, or the use of nonmetallic pipes. However, sometimes factors such as workability, cost, and strength reduction make these methods impractical.

Adjustment of pH.--pH is a number used to express the free hydrogen ion concentration of a solution. The free hydrogen ion concentration determines whether a solution is acid, neutral, or basic and is one of the most important chemical properties of water. The degree of acidity or basicity of a

water frequently determines whether it is suitable for a particular purpose, whether it will be corrosive and whether it will respond to a certain type of treatment. For these reasons, the pH of the water is adjusted in the treatment process.

Postchlorination.--The addition of chlorine at any time after filtration is called postchlorination. Sufficient chlorine is added to the water to ensure that bacterial growth is suppressed from the time the water leaves the treatment plant until it flows from the tap.

Fluoridation.--is the adjustment of the fluoride concentration of water. Fluoride in certain concentrations in water has been shown to reduce dental decay among children significantly. The North Carolina State Board of Health policy states that fluoridation of water is approved and recommended for public and institutional supplies serving communities where there is a strong public demand, and where the decision to fluoridate the water supply is in concurrence with the local dental society, the local medical society, and the local or district health officer, provided that the required procedures for fluoridation for public and institutional supplies are followed.

Rated Capacity of Treatment Plant

The rated capacity of each treatment plant, expressed in million gallons per day, is given in this report. Water treatment may consist of any one of several processes, singly or in various combinations, such as coagulation, sedimentation, filtration, and disinfection. Treatment facilities, ideally, are of sufficient size to provide, without interruption, treated water to meet the demands of the system. The component of the system having the least capacity determines the capacity of the entire system.

Many cities, particularly those using ground water or surface water from protected watersheds, provide limited treatment without having what is normally recognized as a treatment plant. In these cases, chemicals are added usually in the line near the source or at the pumping station, and treatment plant capacity is shown as "None."

Pumping Capacity

The raw water and finished water pumping capacities are listed. In relatively new systems or in systems that have recently pumped water at capacity, the pumping capacities listed are accurate. In older systems, where additions or alterations to the system have been made, the pumping capacities listed often are simply the sum of the rated capacities of the pumps. The latter method is not entirely correct because many factors, such as the condition of the pumps and the head on the pumps, control the pumping capacity. In addition, all water systems have standby pumps, which are normally used in case of a pump failure or when maintenance is performed on the regular pumps but can be used in conjunction with the regular pumps if needed, provided the distribution system can withstand the increased pressure.

Finished Water Storage

Finished water is stored in distribution reservoirs for the purpose of leveling off peaks in demand. Water usage during some hours of the day greatly exceed the capacity of the treatment plant, and these demands are met with water stored during periods of low demand. Distribution reservoirs are generally classed as elevated storage or ground storage. The storage capacity in each type of reservoir is given.

Future Plans

Included in this section are plans for alterations or additions to the major components of the water-supply system. Minor changes in the distribution system are not included.

Water-Resources Appraisals

The quantity of water available in a particular locality is an important factor in the economic growth of the locality. The selection of a source for water supply, whether surface water or ground water, depends on the quantity available and the economic factors involved in developing the source. The water-resources appraisals are a summary of water-supply characteristics of streams and a summary of available information on ground-water conditions in the immediate vicinity of each municipality, including:

Surface water.--The magnitude and frequency of low flows and the average discharge are indicative of the amount of water available for development. In the water-resources appraisals, values for the average discharge and the average 7-day, 2-year minimum flows are listed. In addition, references are made to minimum flow or to the low-flow yield of streams. These references to low flows generally refer to the average 7-day, 20-year minimum flows. Each appraisal also mentions streams for potential future development or a comment on the possibilities of further development of the present source.

Ground water.--Ground-water appraisals include a general evaluation of aquifers at or near the community, reported well depths and yields, and a general statement of the quality of ground water in the area. Where a ground-water constituent is stated as being "excessive" the following criteria were used: acidity--pH less than 5.0; alkalinity--pH greater than 9.0; chloride--more than 250 mg/l (also the criterion for "salty"); dissolved solids--more than 500 mg/l; iron--more than 0.3 mg/l; manganese--more than 0.05 mg/l; and fluoride--more than 1.0 mg/l. The dividing line between "hard" and "soft" is here 60 mg/l of hardness as $CaCO_3$, and the dividing line between "acid" and "alkaline" is pH 7.0. The appraisals also include the estimated potential yield of wells drilled in the immediate vicinity.

CHEMICAL ANALYSES

Water is referred to as the universal solvent because it has the capacity to dissolve at least minute amounts of nearly every substance it touches. Some of the substances dissolved in water, if present in sufficient concentrations, affect the use of the water for public supplies and for some industrial processes. Thus, an important segment of a public water supply inventory is the determination of the kinds and amounts of substances dissolved in the water. In the earlier public water supply inventories only a standard complete analysis of water samples was made. The standard complete analysis included determination of the following constituents and properties of both the raw and finished water:

Silica (SiO_2)	Carbonate (CO_3)	Hardness as $CaCO_3$:
Aluminum (Al)	Sulfate (SO_4)	Total
Iron (Fe)	Chloride (Cl)	Noncarbonate
Manganese (Mn)	Fluoride (F)	Alkalinity as $CaCO_3$
Calcium (Ca)	Nitrate (NO_3)	Specific conductance
Magnesium (Mg)	Nitrite + Nitrate as Nitrogen ($NO_2 + NO_3$ as N)	pH
Sodium (Na)		Color
Potassium (K)	Dissolved solids	Temperature
Bicarbonate (HCO_3)		

Currently, a great deal of research and general interest centers on minor elements and their possible detrimental or beneficial effect on man's health. No one knows when another element will be found to be beneficial, as for example fluoride in reducing dental decay, or when another element will produce a controversy such as that raised by the discovery of excessive mercury concentrations in some waters (Environmental Protection Agency, 1972).

At present, there is a small amount of data on minor-element concentrations in the public water supplies of North Carolina. Some State and Federal agencies have recently started making these determinations, and a base of information is developing. The complexity in making the determinations and the sophisticated equipment required almost rules out these determinations in all but the larger municipal water-treatment laboratories. For these reasons, a decision was made to perform an analysis of selected minor elements in water samples from each public water-supply system. The problem remained to decide which constituents to look for.

Rather complete minor-element analyses on samples from Raleigh's surface-water supply and New Bern's ground-water supply were made to determine which minor elements might be found in North Carolina waters. Based on the results of these analyses and a study of reports in various professional journals, the following list was selected:

Surface-water Source		Ground-water Source	
Barium	Iron	Barium	Cyanide
Boron	Lead	Boron	Iron
Cadmium	Lithium	Cadmium	Lithium
Chloride	Manganese	Chloride	Manganese
Chromium	Mercury	Chromium	Strontium
Cobalt	Strontium	Cobalt	Zinc
Copper	Zinc	Copper	
Cyanide			

The list was reviewed after completion of parts 1 and 2, and one substitution was made. Arsenic was added to the list, and cyanide was deleted. Cyanide was not detected in any of the samples collected. Arsenic, however, has been detected in samples collected for other studies, and it ranged in concentration from 0.001 to 1.1 mg/l (milligrams per litre). The sample containing 1.1 mg/l arsenic was from a stream carrying a large waste load, apparently an extreme situation.

Although minor elements have been added to the analyses contained in this report, this is not to say that the standard complete analyses contained in the former reports are not still valuable to water-works operators and planners. Therefore, the latest standard complete analysis made by the Geological Survey and contained in earlier reports, or a new standard complete analysis, if the source of water has changed, is included for each water-supply system.

The point of collection of water samples depends on the source of supply. For surface supplies, raw-water samples were collected either at the impoundment, from the stream, or from the raw-water tap in the water-treatment plant. Samples of finished water were collected from taps at the water-treatment plant or from the distribution system. For ground-water supplies, raw-water samples were collected directly from the well pump, or, when no outlets were available at the pump, from the tap nearest the well. Samples of finished ground-water were collected from taps in the water-treatment plant or in the distribution system. Water samples for minor-element analyses were, in most cases, collected only from the principal surface-water source or a single well.

The analytical data presented are for one sample at one point in time. In the course of a year, many samples are collected and analyzed by water-works personnel and by the State Board of Health to insure that the water is of acceptable chemical and bacteriological quality. Those interested can obtain more complete data from either of these sources.

COMMON PROBLEMS

Some problems were noted with water-supply record-keeping procedures during the inventory of municipal water supplies. One problem noted, especially in the small water-treatment plants, is a lack of records. The value of accurate records in a water plant cannot be overemphasized. Accurate and complete records are essential to the efficient operation of the water plant and in making projections for future expansion.

The most common problem is the lack of data concerning the dependability of the source of supply, whether surface water or ground water. For small systems on large rivers, there is little worry that the supply is adequate, but for systems that impound or store water for use during periods of low streamflow, the adequacy of the supply should be evaluated continuously. Storage reservoirs continuously lose some of their capacity due to siltation, yet most municipalities list the capacity of their reservoirs as being the same as when they were constructed. The reduction in the storage capacity of reservoirs because of siltation and the minimum flow of the streams that feed the reservoirs should be determined in order to evaluate the adequacy of a supply.

Efficient operation of a ground-water system is not possible without well data. Collection and maintenance of complete records of well construction and operation are standard procedures for properly-run municipal systems using ground water. Analysis of these records can point out potential problems before a failure occurs and may indicate the need for additional wells.

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BEAUFORT COUNTY

WATER-RESOURCES APPRAISAL

Beaufort County is in the east-central part of the Coastal Plain. The county is drained by the Pamlico and Pungo Rivers and their tributaries. In their lower reaches these rivers are estuaries of Pamlico Sound and contain brackish water, as does the sound itself. Much of the county is occupied by swamps. Part of the swampland has been drained by ditches and is used for farming. The average discharge of the non-estuarine streams is 0.7 $(Mgal/d)/mi^2$. Almost all of the non-estuarine streams go dry during droughts. The 7-day, 2-year low flow ranges from 0.0014 to 0.044 $(Mgal/d)/mi^2$ and averages 0.016 $(Mgal/d)/mi^2$.

Belhaven and Washington are the only two public water supplies in the county that have more than 500 customers. Belhaven uses a ground-water supply, and Washington presently uses surface water exclusively but will soon have an auxiliary ground-water supply. A few major industrial ground-water users are in the county as well as many individually-owned ground-water supplies. The county population was 35,980 in 1970.

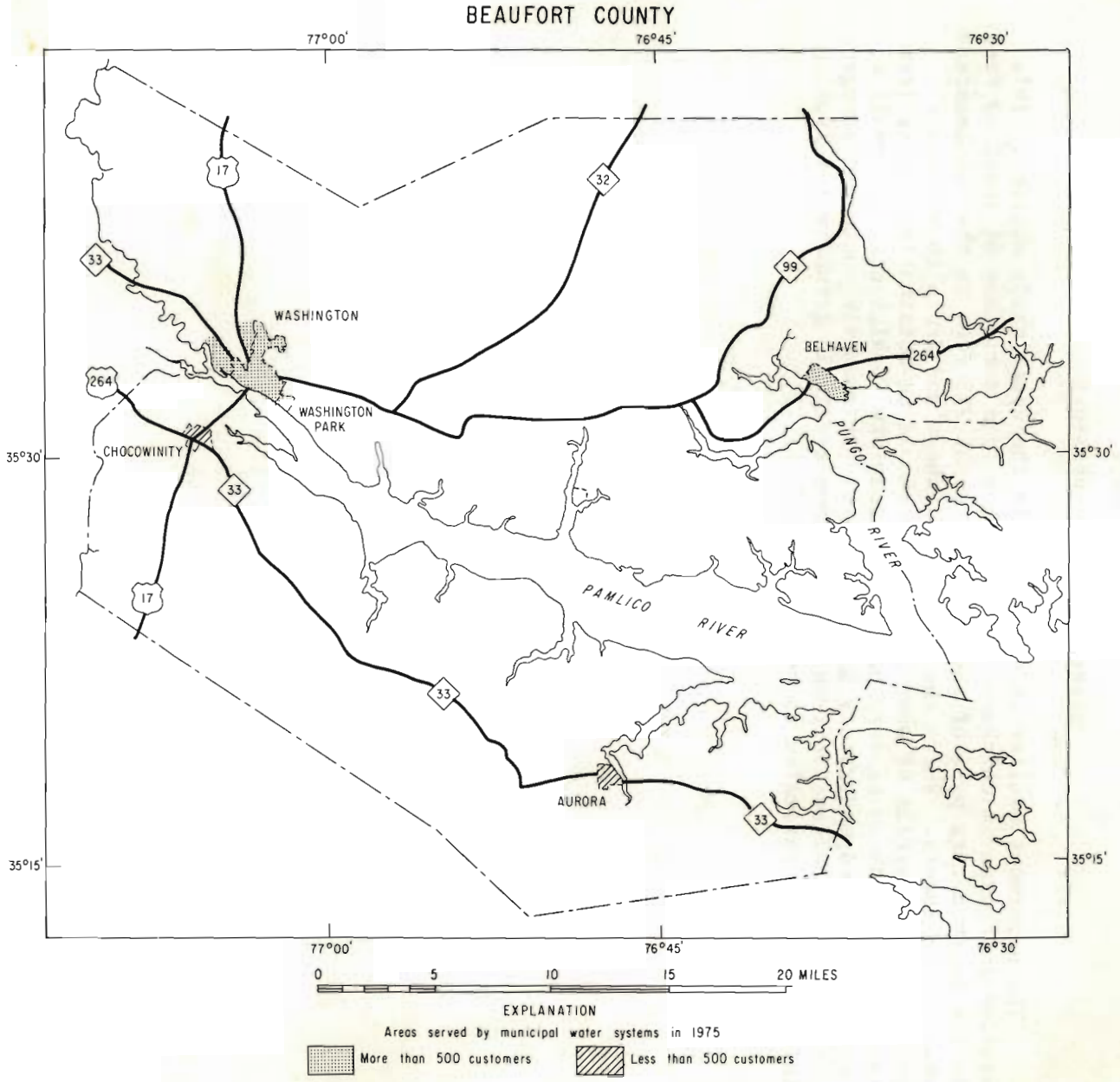
Beaufort County is underlain by up to 3,000 feet of sedimentary deposits ranging in age from Holocene to Cretaceous. However, the depth to brackish water ranges from about 200 feet in the area around Washington to about 400 feet in the southern part of the county. Therefore, only a small percentage of the sedimentary deposits yield water suitable for public use. The principal aquifer in the county is the limestone aquifer. This aquifer is wedge-shaped, thickening eastward from less than 50 feet at Washington to a maximum thickness of about 400 feet at the eastern end of the county. Where the fresh water part of the aquifer is thickest, it could yield as much as several thousand gallons per minute of fresh water to a well. The fresh water from this aquifer tends to be very hard, with a moderately high to high pH, and a moderate to high dissolved-solids concentration. In places, the water may contain hydrogen sulfide or have excessive iron.

The limestone aquifer is not found in the northwestern part of the county, west of Washington. There, the principal aquifer is the lower sandy aquifer. This aquifer is about 1,100 feet thick but only the upper 200 to 400 feet contain fresh water. Depending upon the depth to brackish water, this aquifer should be capable of yielding up to 1,000 gal/min of fresh water to wells. Wells should be adequately spaced, because the maximum estimated recharge is only about .035 $(Mgal/mi^2)/d$. The fresh water ranges from soft to hard and has a moderately high to high pH. In places, the water contains excessive amounts of iron.

BEAUFORT COUNTY

WATER-RESOURCES APPRAISAL

The uppermost aquifer in the county is the upper sandy aquifer. This aquifer increases in thickness southeastward from a minimum of about 50 feet in the northwestern part of the county to about 275 feet in the southeastern part of the county. Where the aquifer thickness and depth to water are greatest, well yields of over 500 gal/min should be obtainable. Water from the aquifer tends to be very hard, has a moderate to high dissolved-solids concentration and moderately high pH values. It commonly contains hydrogen sulfide gas and excessive iron. The maximum available ground water from this aquifer is estimated to be 1.0 (Mgal/d)/mi^2.


BEAUFORT COUNTY
77°00'
76°45'
76°30'
35°30'
35°15'
17
32
33
99
264
WASHINGTON
WASHINGTON PARK
CHOCOWINITY
BELHAVEN
PUNGO RIVER
PAMLICO RIVER
AURORA
0 5 10 15 20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
More than 500 customers
Less than 500 customers

BELHAVEN, BEAUFORT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 2,400 in 1974 (about 900 metered customers).

SOURCE:

Two wells (Nos. 1 and 2).

Well No. 1, Bo-345, lat 35°33'32", long 76°37'18". Driller. Layne-Atlantic Co. Date drilled: Sept. 1968. Total depth: 160 ft. Diam: 20 to 10 in. Cased to: 105 ft. Type of finish: screened (gravel-packed). Screened intervals: 105-155 ft. Topography: flat. Aquifer: upper sandy. Static water level: 8 ft below land surface. Well yield: 360 gal/min. Pump capacity: 350 gal/min. Type pump: submersible.

Well No. 2, Bo-346, lat 35°33'40", long 76°37'28". Driller: Layne-Atlantic Co. Date drilled: Oct. 1968. Total depth: 150 ft. Diam: 20 to 10 in. Cased to: 95 ft. Type of finish: screened (gravel-packed). Screened intervals: 95-145 ft. Topography: flat. Aquifer: upper sandy. Static water level: 6 ft below land surface. Well yield: 360 gal/min. Pump capacity: 350 gal/min. Type pump: submersible.

TOTAL USE:

Average (1974), 0.3 Mgal/d. Maximum (1971), 0.48 Mgal/d.

INDUSTRIAL USE:

0.1 Mgal/d, estimated.

TREATMENT:

Aeration, pressure filtration, zeolite process for softening, and postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

0.5 Mgal/d.

PUMPING CAPACITY:

Raw water, 1.0 Mgal/d; finished water, 0.5 Mgal/d.

RAW-WATER STORAGE:

One ground tank, 18,000 gallons.

FINISHED-WATER STORAGE:

Two elevated tanks, 200,000 and 75,000 gallons.

FUTURE PLANS:

None.

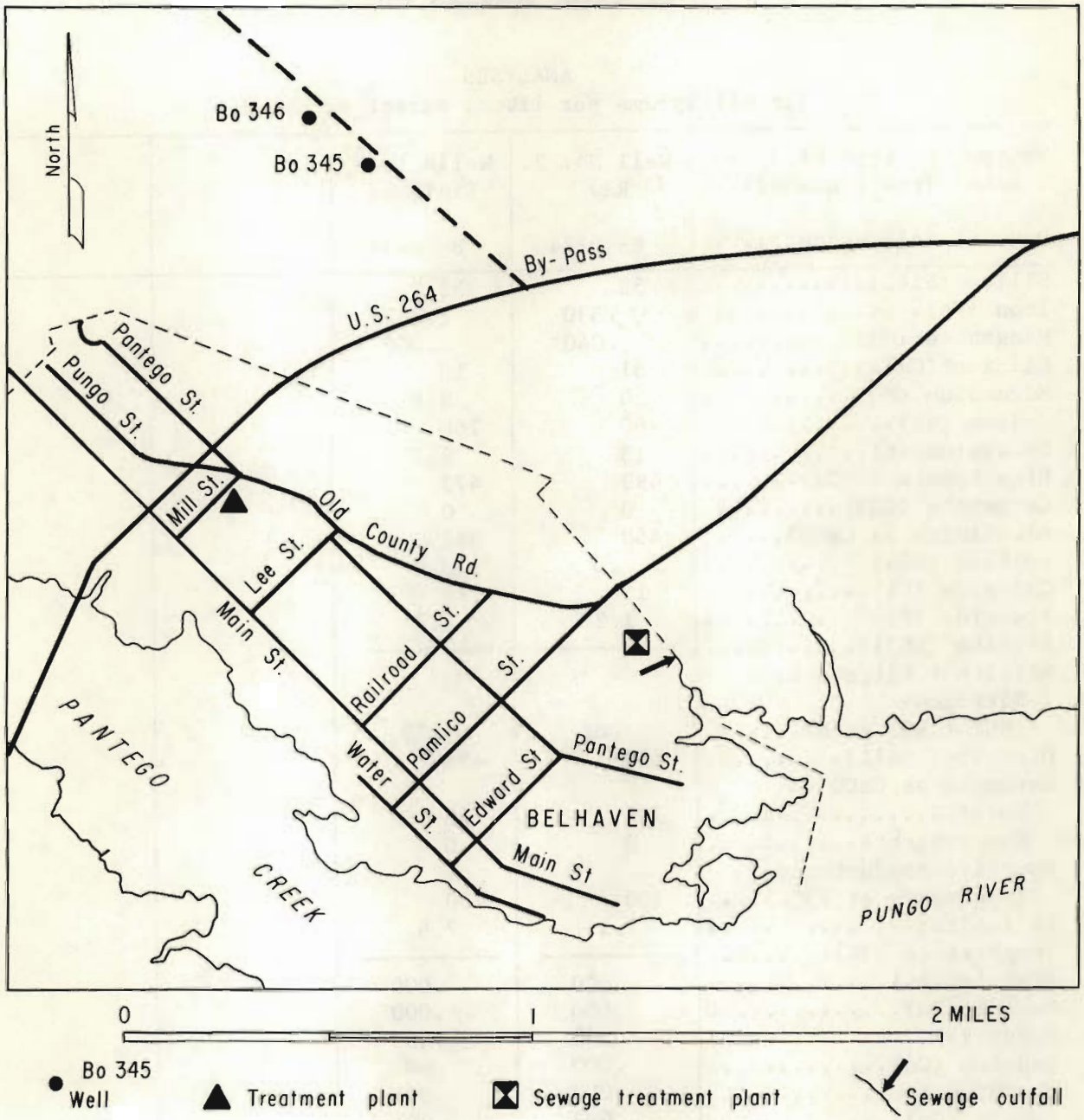
BELHAVEN, BEAUFORT COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Belhaven is in northeastern Beaufort County at the confluence of Pantego Creek and Pungo River. These streams are estuarine and are salty all or most of the time. Natural drainage in the area is poorly defined. Much of the drainage is provided by agricultural ditching in the surrounding swamplands. The fresh-water streams go dry in drought. Drainage canals might be considered as a fresh-water source, but these too, are probably unreliable in drought. The average streamflow in the area is 0.7 $(Mgal/d)/mi^2$.

Ground water: The surface of the Belhaven area is underlain by about 240 feet of deposits belonging to the upper sandy aquifer. The best water-bearing zone in these deposits occurs between about 40 and 160 feet. This zone can yield up to 500 gal/min to wells. The water from this zone tends to be very hard, has a high dissolved-solids concentration, and has a moderately high pH. It may contain objectionable quantities of hydrogen sulfide, iron, and fluoride. The upper sandy aquifer is underlain by about 300 feet of limestone belonging to the limestone aquifer. This aquifer is found at a depth of about 240 feet and contains fresh water to a depth of about 350 feet. Individual wells in this aquifer will yield a few thousand gallons per minute of fresh water. However, such heavy pumping would induce rapid vertical encroachment of brackish water. The chemical quality of fresh water from this aquifer is similar to that of the upper sandy aquifer except that water in the limestone aquifer has higher dissolved-solids concentrations including chloride and sodium.

TOWN OF BELHAVEN



BELHAVEN, BEAUFORT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 2. Raw	Wells 1,2[a] Finished		
Date of collection.....	8- 6-74	8- 6-74		
Silica (SiO_2).....	53	53		
Iron (Fe).....	.330	.100		
Manganese (Mn).....	.040	.000		
Calcium (Ca).....	81	16		
Magnesium (Mg).....	20	3.8		
Sodium (Na).....	60	160		
Potassium (K).....	13	6.5		
Bicarbonate (HCO_3).....	499	477		
Carbonate (CO_3).....	0	0		
Alkalinity as $CaCO_3$.....	409	391		
Sulfate (SO_4).....	.8	3.0		
Chloride (Cl).....	13	15		
Fluoride (F).....	1.2	.2		
Nitrate (NO_3).....	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.01	.79		
Dissolved Solids.....	490	496		
Hardness as $CaCO_3$:				
Total.....	290	56		
Noncarbonate.....	0	0		
Specific conductance (micromhos at 25°C)....	700	700		
pH (units).....	7.1	7.6		
Temperature (°C).....	----------	----------		
Arsenic (As).....	.000	.000		
Barium (Ba).....	.000	.000		
Boron (B).....	.290	.280		
Cadmium (Cd).....	.000	.001		
Chromium (Cr).....	.000	.001		
Cobalt (Co).....	.003	.001		
Copper (Cu).....	.001	.004		
Lead (Pb).....	----------	----------		
Lithium (Li).....	.024	.009		
Mercury (Hg).....	----------	----------		
Strontium (Sr).....	1.000	.080		
Zinc (Zn).....	.007	.030		

[a] Composite sample.

WASHINGTON, BEAUFORT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 10,000 in 1974 (3,570 customers).

SOURCE:

Tranters Creek. Two intakes. One is at Clarks Neck about 2 miles northwest of Washington at lat 35°33'48", long 77°05'12". The drainage area at this intake is 240 mi^2, approximately. The other intake is at Latham Station about 6 miles northwest of Washington at lat 35°36'16", long 77°08'34". The drainage area at this intake is 224 mi^2, approximately. This intake is used during low flow periods when the chloride content of the water at the lower (Clarks Neck) intake is excessive.

RAW-WATER STORAGE:

None.

ALLOWABLE DRAFT:

Estimated allowable draft of Tranters Creek at Latham Station with no storage is 2.6 Mgal/d.

TOTAL USE:

Average (1974), 1.6 Mgal/d estimated; maximum daily (7-18-69), 2.235 Mgal/d, metered.

INDUSTRIAL USE:

0.35 Mgal/d, estimated. Principal users include National Spinning Co. and Hamilton Beach Corp.

TREATMENT:

Prechlorination; coagulation with alum, lime, and sodium silicate; sedimentation; addition of carbon for control of taste and odor; rapid sand filtration; addition of phosphate compounds for corrosion control; adjustment of pH with lime; and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

2.2 Mgal/d.

PUMPING CAPACITY:

Raw water, 2.8 Mgal/d; finished water, 3.4 Mgal/d.

FINISHED-WATER STORAGE:

Two clear wells, 400,000 and 500,000 gallons; two elevated tanks, 300,000 and 500,000 gallons.

FUTURE PLANS:

Will put a newly-drilled well with its own treatment plant and 500,000-gallon elevated tank into the system.

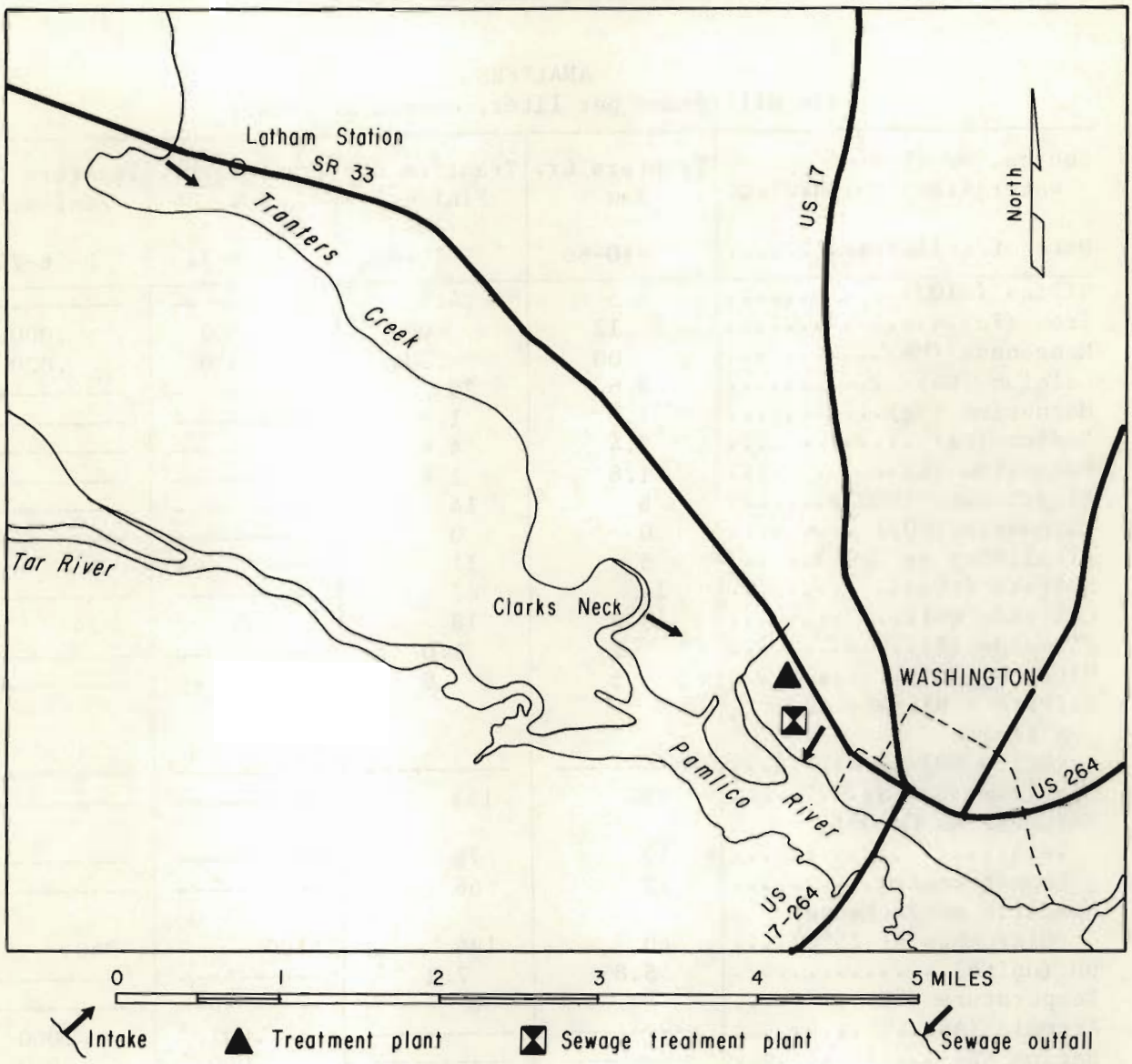
WASHINGTON, BEAUFORT COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Washington is in western Beaufort County about a mile east of where the Tar River and Tranters Creek merge to form the Pamlico River. The Pamlico River is entirely estuarine as are the lower reaches of its tributaries. During low flow periods, most of the estuary contains brackish water. For this reason, the city has an alternate intake about 6 miles upstream. The area in the vicinity of the town is flat, except when it is crossed by streams having broad swampy flood plains. Most of the non-estuarine streams go dry in drought, even those with drainage areas as great as 50 square miles. The 7-day, 2-year low flow is about .02 $(Mgal/d)/mi^2$. The average flow is about 0.7 $(Mgal/d)/mi^2$.

Ground water: Washington is underlain by the upper sandy aquifer having a thickness of about 60 feet. These deposits in turn are underlain by about 100 feet of very permeable limestone belonging to the limestone aquifer which will yield up to about 500 gal/min to individual wells. The water from the limestone aquifer would probably be very hard, with a moderately high pH and moderately high dissolved-solids concentration. It might have an excessive iron concentration. The limestone aquifer is underlain by the lower sandy aquifer. While the thickness of this aquifer is great, only the upper 50 feet or so contain fresh water. Because of the thinness and moderate permeability of the fresh-water zone within the lower sandy aquifer, individual wells would probably not yield more than 100 gal/min of fresh water. The water from this aquifer might be softer than the water from the limestone aquifer but would have a greater dissolved-solids concentration.

CITY OF WASHINGTON



WASHINGTON, BEAUFORT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Tranters Cr. Raw	Tranters Cr. Finished	Tranters Cr. Raw	Tranters Cr. Finished
Date of collection.....	3-10-66	3-10-66	8- 6-74	8- 6-74
Silica (SiO_2).....	4.5	4.9	----------	----------
Iron (Fe).....	.12	.00	.360	.000
Manganese (Mn).....	.00	.00	.020	.020
Calcium (Ca).....	4.6	29	----------	----------
Magnesium (Mg).....	1.0	1.5	----------	----------
Sodium (Na).....	3.4	4.6	----------	----------
Potassium (K).....	1.8	1.8	----------	----------
Bicarbonate (HCO_3).....	6	14	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	5	11	----------	----------
Sulfate (SO_4).....	11	47	----------	----------
Chloride (Cl).....	5.0	18	7.5	24
Fluoride (F).....	.2	1.0	----------	----------
Nitrate (NO_3).....	.5	.8	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	58	133	----------	----------
Hardness as $CaCO_3$:				
Total.....	17	78	----------	----------
Noncarbonate.....	12	66	----------	----------
Specific conductance (micromhos at 25°C)....	60	194	100	240
pH (units).....	5.8	7.2	----------	----------
Temperature (°C).....	----------	----------	----------	----------
Arsenic (As).....	----------	----------	.001	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.070	.050
Cadmium (Cd).....	----------	----------	.000	.000
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.002	.003
Copper (Cu).....	----------	----------	.003	.001
Lead (Pb).....	----------	----------	.008	.013
Lithium (Li).....	----------	----------	.003	.006
Mercury (Hg).....	----------	----------	.0002	----------
Strontium (Sr).....	----------	----------	.100	.100
Zinc (Zn).....	----------	----------	.080	.004

BERTIE COUNTY

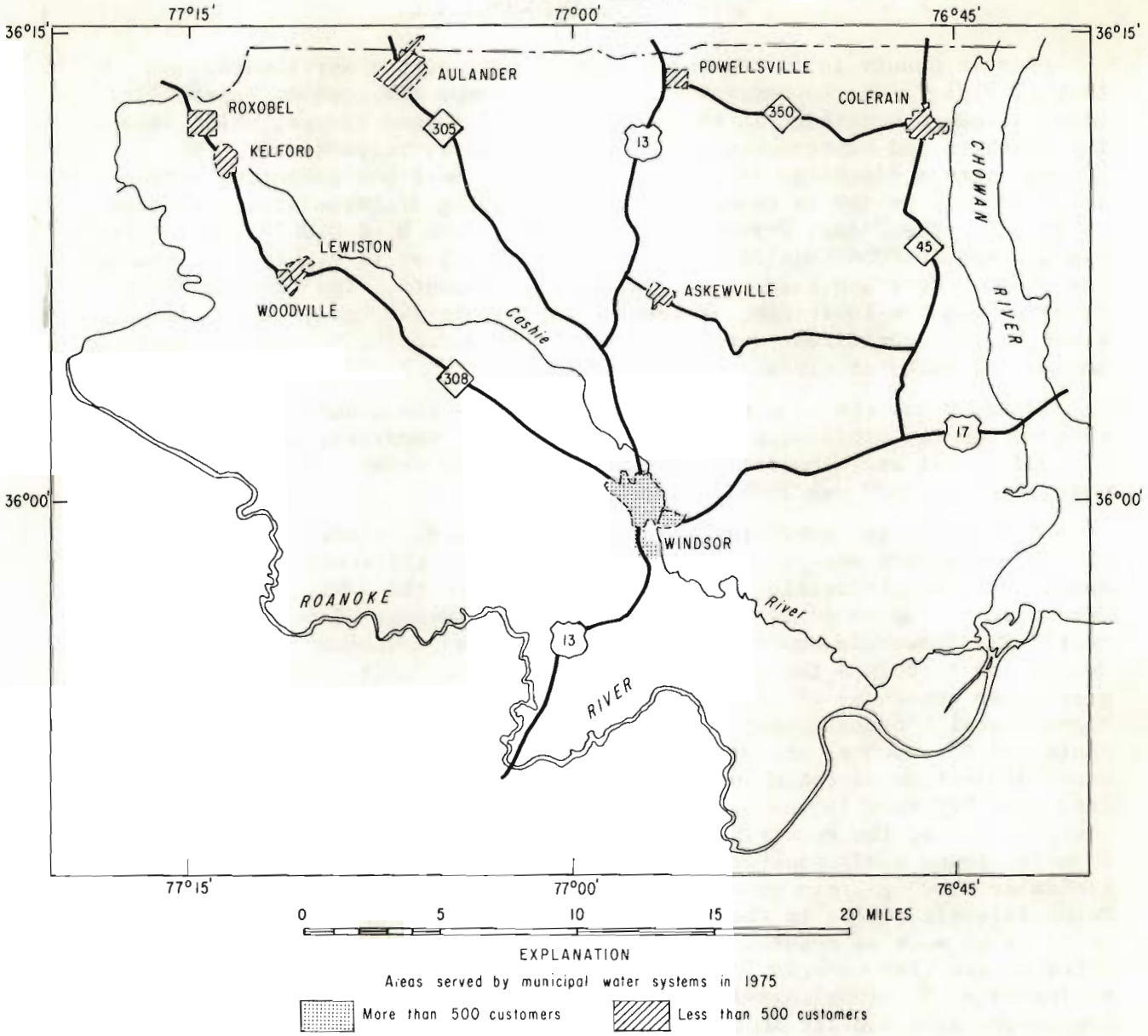
WATER-RESOURCES APPRAISAL

Bertie County is in the north-central part of the North Carolina Coastal Plain. The topography is flat and swamps are common, especially along streams. Drainage is to the Roanoke and Chowan Rivers, which form the southern and eastern boundaries of the county, respectively. The average stream discharge is 0.7 $(Mgal/d)/mi^2$. Most non-estuarine streams in the county go dry in drought, even some having drainage areas as large as 60 mi^2. The 7-day, 2-year low flow ranges from 0 to 0.0013 $(Mgal/d)/mi^2$ and averages 0.0006 $(Mgal/d)/mi^2$. The Roanoke River is highly regulated by the John H. Kerr and Roanoke Rapids dam impoundments. The minimum daily release from the lower dam, at Roanoke Rapids, is 646 Mgal. The Chowan River has no significant impoundments. It is estuarine in Bertie County and may be salty at times.

Windsor has the only public water supply in the county with 500 or more customers. This supply, the smaller public supplies, and virtually all individual and commercial supplies use ground water. The county population in 1970 was 20,528.

The county is underlain by a sequence of sands, clays, and limestones that thicken from west to east. In the west, the thickness of these beds is about 400 feet, increasing to about 1,900 feet in the east. Of these deposits, the upper sandy aquifer comprises an average of only about 100 feet. The limestone aquifer is found only in the southeast part of the county and is only a few tens of feet thick. The lower sandy aquifer comprises the remainder of the deposits. In the western third of the county, these deposits contain only fresh water, except in a few localities. In the center of the county, the depth to brackish water is about 600 feet. The depth diminishes eastward so that brackish water would probably be found at less than 300 feet in the vicinity of the Chowan River estuary. In the western part of the county, well yields of 500 gal/min should be obtainable from the lower sandy aquifer, while in the center of the county fresh-water yields of 1,000 gal/min or more may be obtainable from the same aquifer. Potential well yields in the eastern part of the county are uncertain but could be as much as several hundred gallons per minute, depending upon the depth to brackish water. The maximum ground-water yield in the county is estimated at 0.9 $(Mgal/d)/mi^2$. The maximum recharge that can be induced to the lower sandy aquifer is estimated at 0.06 $(Mgal/d)/mi^2$. The water from both deep and shallow wells tends to be soft unless the water is derived from the limestone aquifer. However, water from the upper sandy aquifer tends to be corrosive and may contain excessive iron. Fresh water from the lower sandy aquifer tends to have near-neutral to high pH, moderate to high dissolved-solids concentration, and may have an excessive fluoride concentration.

BERTIE COUNTY



WINDSOR, BERTIE COUNTY

OWNERSHIP:

Municipal. Total population supplied about 3,000 (750 customers). Also supplies the south Windsor Water Association.

SOURCE:

Three wells (Nos. 1-3)

Well No. 1 (formerly city well No. 6), Be-79, located at lat 36°00'00", long 76°57'25". Driller: Layne-Atlantic Co. Date drilled: June 1963. Total depth: 390 ft. Diam: 10 in. Cased to: 226 ft. Type of finish: screened (gravel-packed). Screened intervals: 227-232 ft, 258-273 ft, 298-303 ft, 313-318 ft, 330-340 ft, 370-380 ft. Topography: flat. Aquifer: lower sandy. Static water level: 31 ft. Pump capacity: 500 gal/min. Pump setting: 180 ft. Type pump: turbine.

Well No. 2 (auxiliary), Be-64, located at lat 35°59'43", long 76°56'54". Driller: Layne-Atlantic Co. Date drilled: June 1955. Total depth: 370 ft. Diam: 10 in. Cased to: 251 ft. Type of finish: screened (gravel-packed). Screened intervals: 251-261 ft, 276-286 ft, 311-331 ft, 351-361 ft. Topography: flat. Aquifer: lower sandy, Static water level: at land surface. Pump capacity: estimated 300 gal/min. Pump setting: 100 ft. Type pump: turbine.

Well No. 3 (auxiliary, formerly well No. 4), Be-78, located at lat 36°59'33", long 76°56'39". Driller: Layne-Atlantic Co. Date drilled: October 1953. Total depth: 397 ft. Diam: 8 in. Cased to: 210 ft. Type of finish: screened (gravel-packed). Screened intervals: 210-220 ft, 256-266 ft, 316-326 ft, 386-397 ft. Topography: flat. Aquifer: lower sandy. Static water level: flowed. Pump capacity: estimated 200 gal/min. Pump setting: 100 ft. Type pump: turbine.

TOTAL USE:

Average (1974), 0.17 Mgal/d, estimated; maximum daily, about 0.2 Mgal/d.

INDUSTRIAL USE:

0.095 Mgal/d (estimated). Principal users include Blue Bell, Inc., Coulbourn Lumber Co., and Stubb's Veneer Co.

TREATMENT:

None.

PUMP CAPACITY:

1.4 Mgal/d.

FINISHED-WATER STORAGE:

One ground tank, 101,000 gallons; one elevated tank, 300,000 gallons.

FUTURE PLANS:

None.

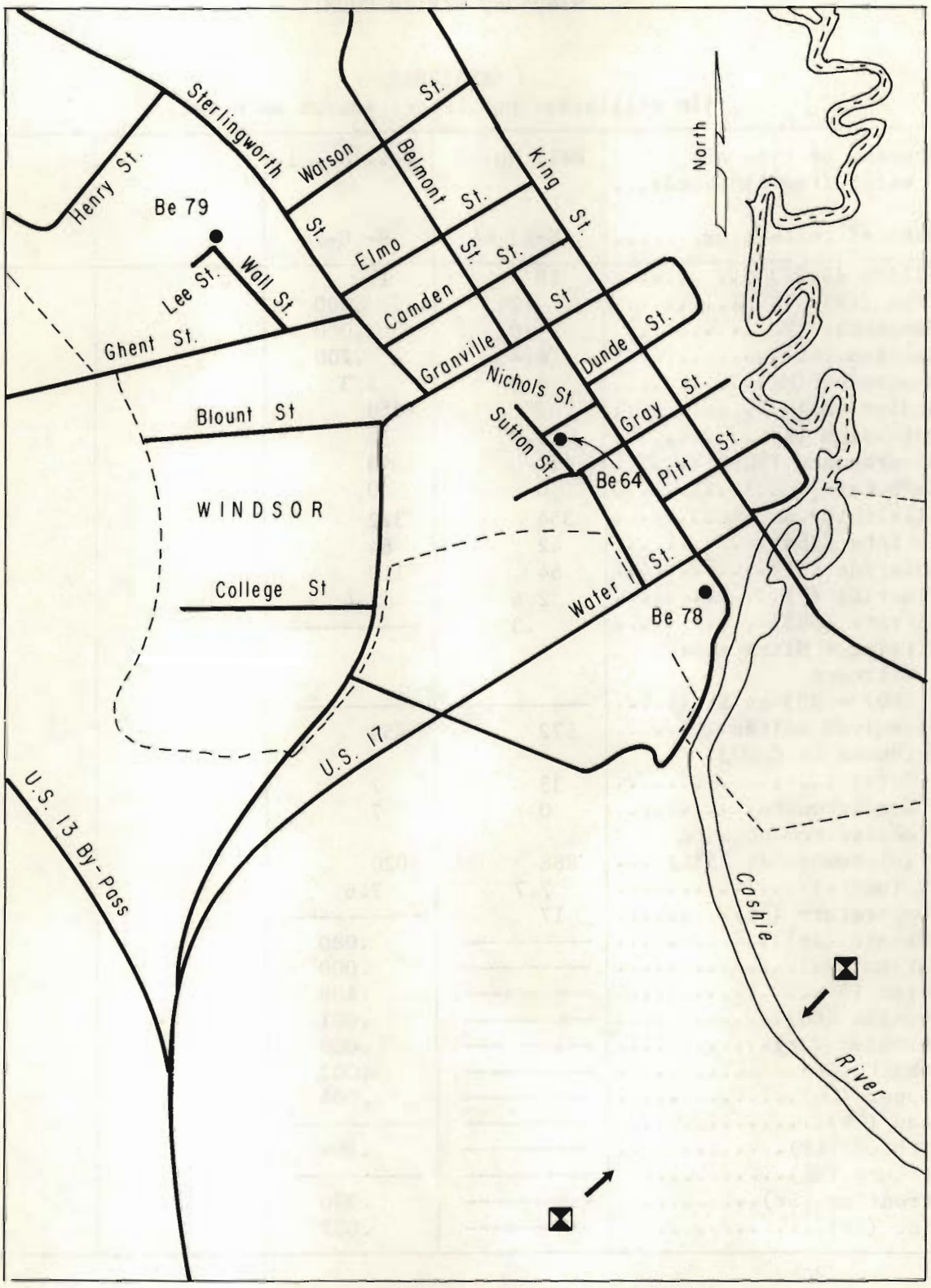
WINDSOR, BERTIE COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Windsor is on the Cashie River in south-central Bertie county. The topography is flat and stream courses tend to be swampy. The flow characteristics of the Cashie River are not known with any certainty. However, it is improbable that a reliable surface-water supply could be developed in the Windsor area without a prohibitive amount of artificial storage.

Ground water: The town is underlain by about 1,000 feet of sands and clays. Less than 100 feet of these deposits are of the upper sandy aquifer; the remainder are of the lower sandy aquifer. The depth to brackish water is not known, but is estimated to be about 500 feet. Well yields of up to 1,000 gal/min of fresh water could probably be obtained from the lower sandy aquifer. Fresh water from the lower sandy aquifer in the area tends to be very soft, very alkaline, and to have excessive concentrations of fluoride and dissolved solids.

TOWN OF WINDSOR



WINDSOR, BERTIE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)	Well No. 3	Well No. 1		
Date of collection	6-21-66	8- 8-74		
Silica (SiO_2)	18	17		
Iron (Fe)	.24	.000		
Manganese (Mn)	.01	.000		
Calcium (Ca)	6.4	.700		
Magnesium (Mg)	4.0	1.3		
Sodium (Na)	203	250		
Potassium (K)	9.0	12		
Bicarbonate (HCO_3)	432	393		
Carbonate (CO_3)	0	0		
Alkalinity as $CaCO_3$	354	322		
Sulfate (SO_4)	42	64		
Chloride (Cl)	64	110		
Fluoride (F)	2.6	2.4		
Nitrate (NO_3)	.3	---		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	---	---		
Dissolved Solids	572	459		
Hardness as $CaCO_3$:				
Total	33	7		
Noncarbonate	0	7		
Specific conductance (micromhos at 25°C)	888	1020		
pH (units)	7.7	7.6		
Temperature (°C)	17	---		
Arsenic (As)	---	.000		
Barium (Ba)	---	.000		
Boron (B)	---	.400		
Cadmium (Cd)	---	.001		
Chromium (Cr)	---	.000		
Cobalt (Co)	---	.002		
Copper (Cu)	---	.004		
Lead (Pb)	---	---		
Lithium (Li)	---	.009		
Mercury (Hg)	---	---		
Strontium (Sr)	---	.030		
Zinc (Zn)	---	.007		

CAMDEN COUNTY

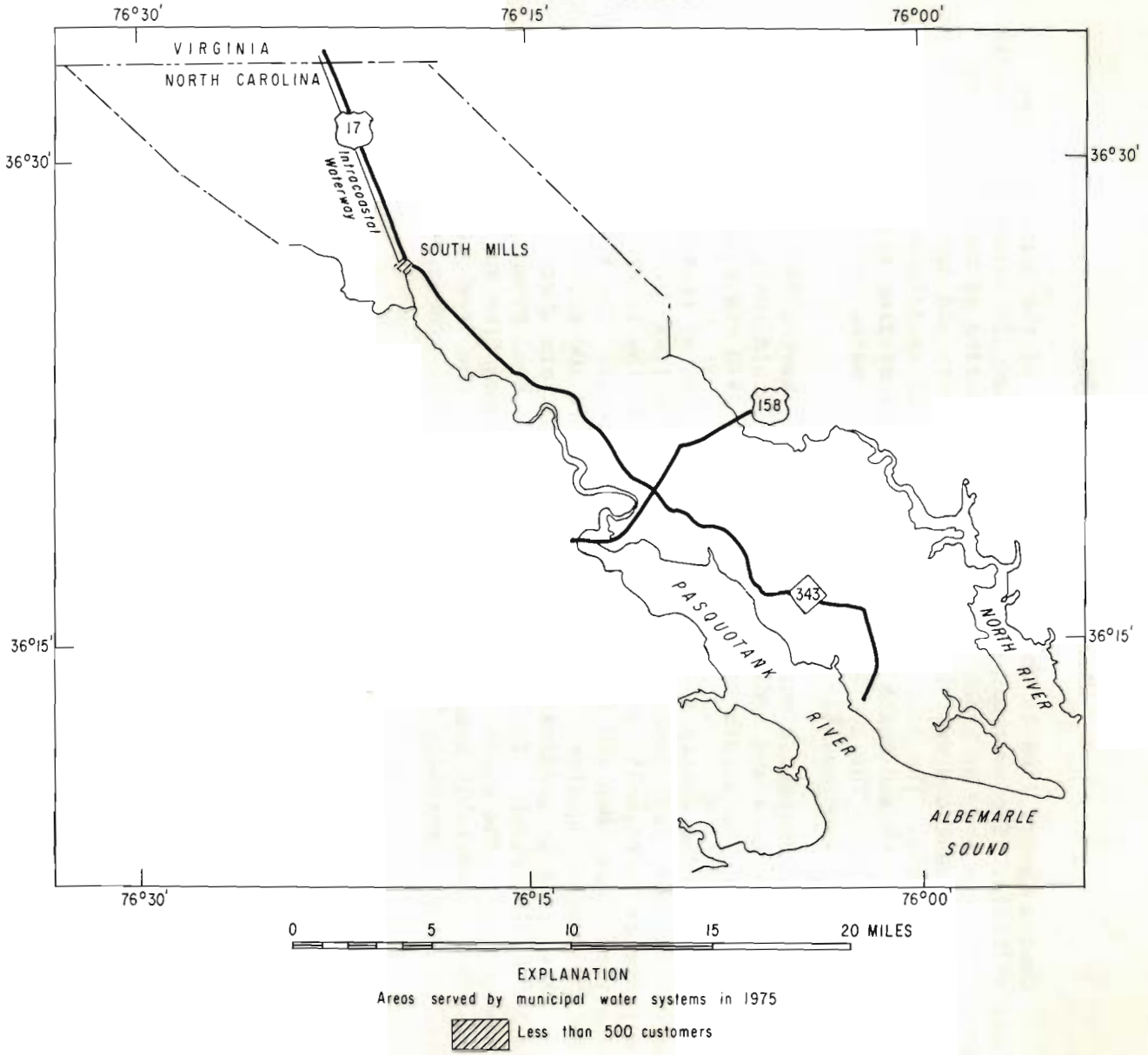
WATER-RESOURCES APPRAISAL

Camden County lies in the northeastern part of the North Carolina Coastal Plain. The southern boundary of the county is formed by Albemarle Sound, a large body of brackish water. The estuaries of the sound form parts of the east and west boundaries of the county and are brackish all or part of the year. The county consists largely of swampland. It is drained by the Pasquotank and North Rivers and their tributaries and the Intracoastal waterway. The average streamflow is estimated at 0.7 $(Mgal/d)/mi^2$. The smaller streams usually go dry in drought.

There are no public supplies in the county having 500 or more customers. Smaller communities and individual homeowners obtain their supplies from ground water. The population of the county in 1970 was 5,453.

Although the county is underlain by thousands of feet of sedimentary rock, only the upper hundred feet or so contains fresh water. The depth to salty water is normally greater than 100 feet in the northern half of the county and less than 100 feet in the southern half. The fresh water is in the upper sandy aquifer. This aquifer can yield 100 gal/min where the depth to salty water is greatest, but less than 50 gal/min where the salty water is at shallow depth. The estimated maximum yield of ground water is 1.0 $(Mgal/d)/mi^2$. The water from shallow wells ranges from soft to very hard and almost invariably contains excessive iron. The fresh water from the deeper wells is normally hard and may also contain excessive iron.

CAMDEN COUNTY



CHOWAN COUNTY

WATER-RESOURCES APPRAISAL

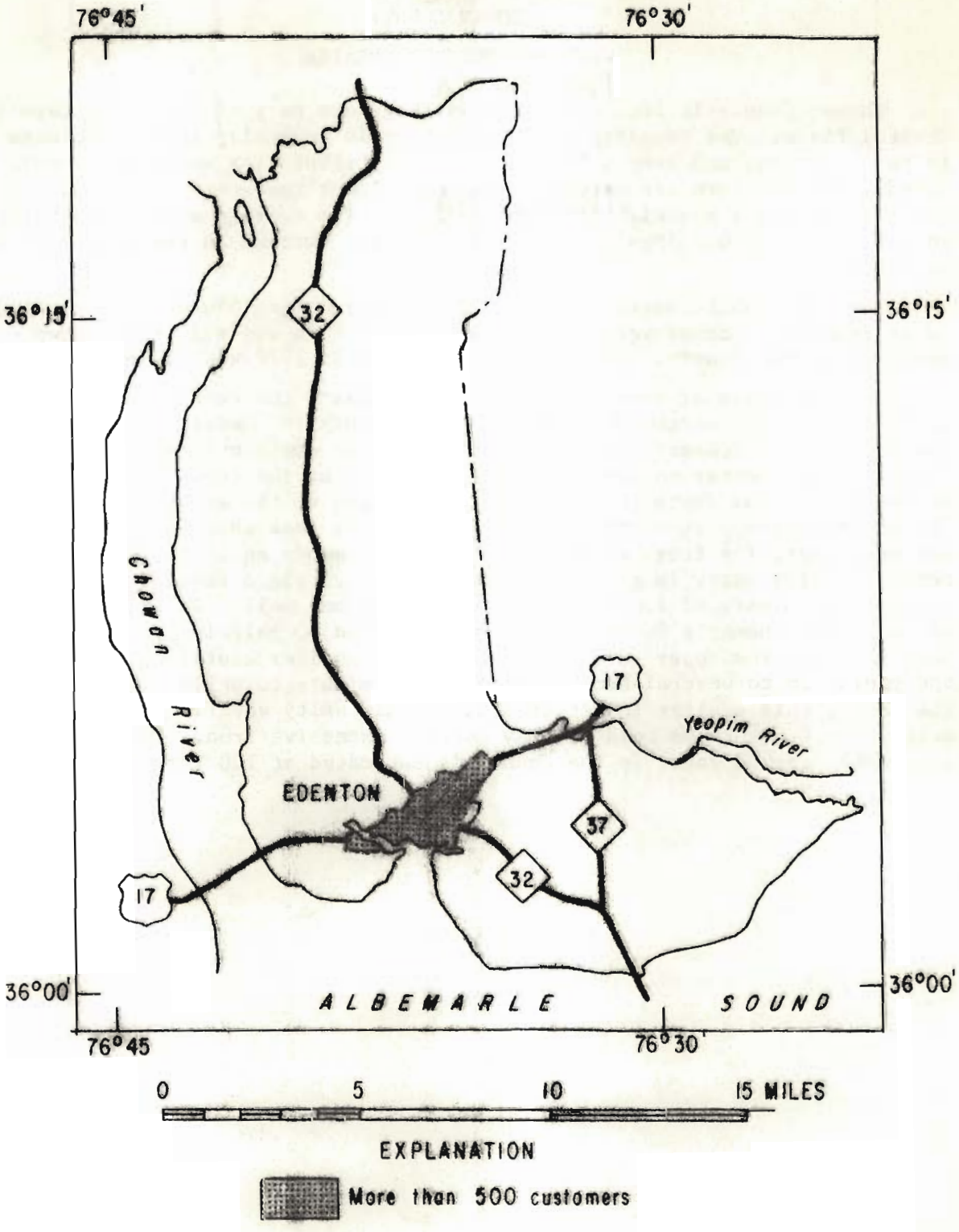
Chowan County is located in the northeastern part of the North Carolina Coastal Plain. The topography of the county is generally flat. Drainage is to the Chowan and Yeopin Rivers and their tributaries and to Albemarle Sound. These rivers are estuarine in their lower reaches. The sound and its estuaries are brackish part of the time. The average stream discharge in the county is 0.7 (Mgal/d)/mi^2. Most of the streams in the county go dry during drought.

The only public water supply in the county having 500 or more customers is at Edenton. Ground water is the source for this and all other known supplies in the county. The county population in 1970 was 10,764.

The thickness of sedimentary deposits beneath the county ranges from 1,500 feet in the northwestern part of the county to almost 3,000 feet in the southeast. However, only the uppermost beds contain fresh water. The depth to salty water in the northwestern corner of the county is in excess of 400 feet. The depth to salty water decreases to the southeast so that in the southeastern part of the county the depth is less than 100 feet. For the most part, the fresh water is in the upper sandy aquifer. Where the depth to salty water is greatest this aquifer can yield several hundred gallons per minute of fresh water to an individual well. In the immediate vicinity of Albemarle Sound, yields of less than 50 gal/min can be expected. Near Edenton, the upper part of the limestone aquifer contains fresh water and yields up to several hundred gallons per minute to wells. Elsewhere in the county this aquifer is reported to contain salty water. The water from deep wells tends to be hard and may contain excessive iron. The maximum obtainable ground water in the county is estimated at 1.0 (Mgal/d)/mi^2.

4

CHOWAN COUNTY



EDENTON, CHOWAN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 5,000 in 1974 (1,551 metered customers).

SOURCE:

Three wells.

Virginia Road well, Cn-240, located at lat 36°04'11", long 76°36'26". Driller: Layne-Atlantic Co. Date drilled: 1936. Total depth: 358 ft. Diam: 10 in to 8 in. Cased to: 219 ft. Type of finish: screened (gravel-packed). Screened intervals: 219-239, 259-264, and 335-355 ft. Topography: flat. Aquifer: limestone. Static water level: 19 ft. Well yield: 500 gal/min. Pump capacity: estimated. Pump setting: 100 ft. Type pump: turbine.

Beaver Hill well, Cn-335, located at lat 36°04'00", long 76°36'58". Driller: Singer-Layne Atlantic Co. Date drilled: 1971. Total depth: 260 ft. Diam: 20 in to 10 in. Cased to: 210 ft. Type of finish: screened (gravel-packed). Screened intervals: 210-240 and 245-255 ft. Topography: flat. Aquifer: limestone. Static water level: 26 ft. Well yield: 525 gal/min. Pump capacity: 500 gal/min. Pump setting: 153 ft. Type pump: Turbine.

Freemason St. well (New), Cn-336, located at lat 36°03'54", long 76°36'31". Driller: Singer-Layne Atlantic Co. Date drilled: Nov. 1973. Total depth: 272 ft. Diam: 20 in to 10 in. Cased to: 212 ft. Type of finish: screened (gravel-packed). Screened intervals: 212-242 and 257-267 ft. Topography: flat. Aquifer: limestone. Static water level: 30 ft. Well yield: 500 gal/min. Pump capacity: 500 gal/min. Pump setting: 125 ft. Type pump: turbine.

TOTAL USE:

Average (1974) 0.5 Mgal/d estimated; maximum daily not determined.

INDUSTRIAL USE:

0.13 Mgal/d estimated. Principal users include Geo. C. Moore Co., Seabrook Blanching Corp., Edenton Cotton Mills, and Carter's Ink Co.

TREATMENT:

Aeration, prechlorination, sedimentation, zeolite process for softening, addition of phosphate compounds for corrosion control, adjustment of pH with lime and soda ash, postchlorination.

RATED CAPACITY OF TREATMENT PLANTS:

Two plants, 0.864 and 0.743 Mgal/d.

PUMPING CAPACITY:

Raw water, 2.16 Mgal/d; finished water, 1.61 Mgal/d.

EDENTON, CHOWAN COUNTY

RAW-WATER STORAGE:

Two ground tanks of approximately 67,000 gallons each.

FINISHED-WATER STORAGE:

Two elevated tanks, 500,000 and 300,000 gallons.

FUTURE PLANS:

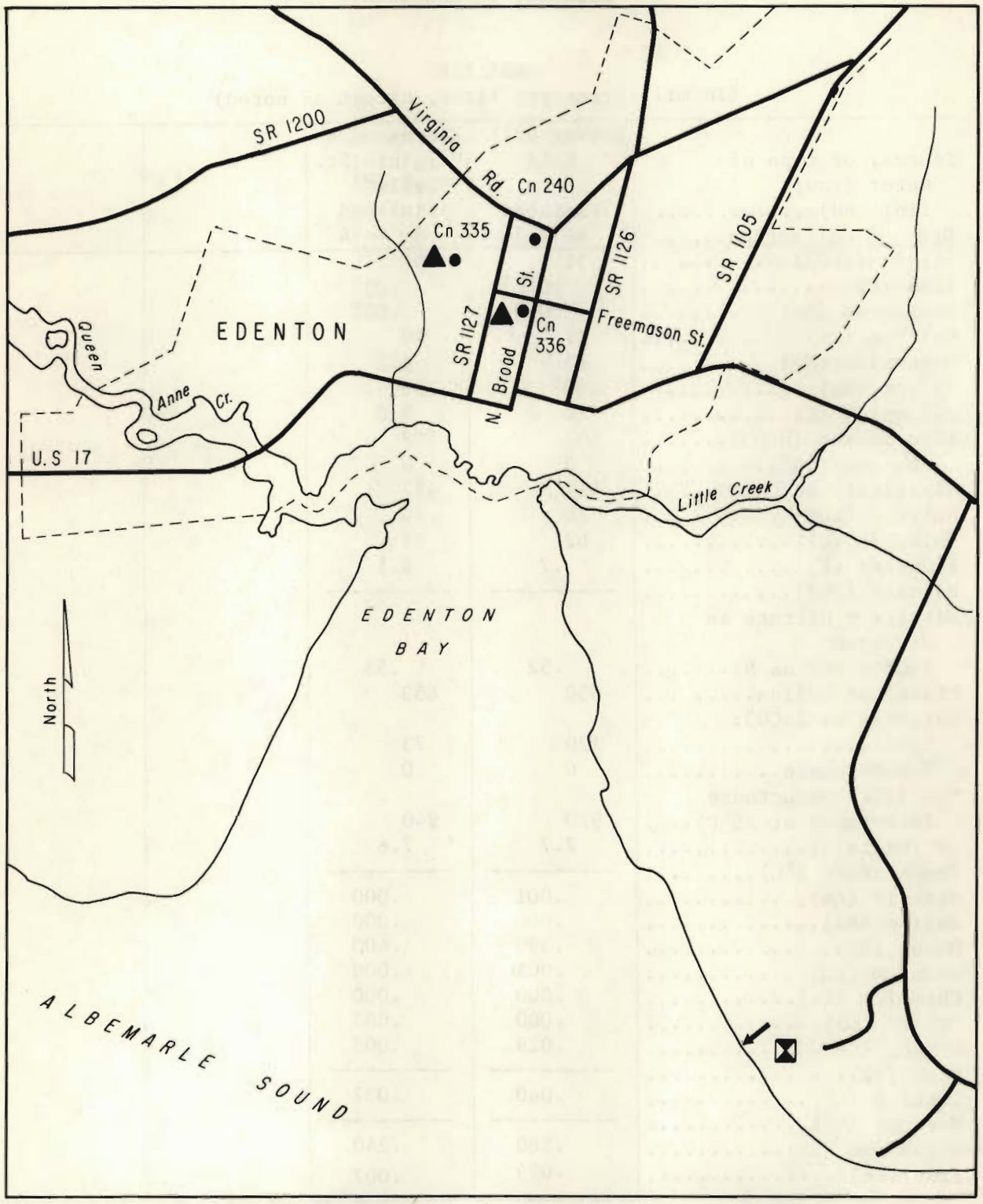
None.

WATER-RESOURCES APPRAISAL:

Surface water: Edenton is located at the head of Edenton Bay in southwest Chowan County. The topography in the vicinity is low and flat. The bay and the nearby Chowan River estuary and Albemarle Sound are not suitable for a public water supply because of recurrent excessive chloride concentrations. The streams in the vicinity go dry in drought.

Ground water: The town is underlain by about 200 feet of alternating beds of sand, clay, and shells, which belong to the upper sandy aquifer and contain fresh water. Wells in this aquifer can yield up to 100 gal/min. The upper sandy aquifer is underlain by the limestone aquifer. Although only the upper part of the limestone aquifer contains fresh water, it can, nevertheless, yield several hundred gallons per minute of fresh water to individual wells and is the source of the town's water. Water from deep wells in the area tends to be very hard and may contain excessive iron.

TOWN OF EDENTON



EDENTON, CHOWAN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished).....	Beaver Hill Well	Freemason & Virginia St. Wells[a]		
Date of collection.....	Finished 8- 7-74	Finished 8- 7-74		
Silica (SiO_2).....	51	50		
Iron (Fe).....	.020	.030		
Manganese (Mn).....	.000	.020		
Calcium (Ca).....	27	19		
Magnesium (Mg).....	13	6.1		
Sodium (Na).....	180	220		
Potassium (K).....	26	9.0		
Bicarbonate (HCO_3).....	503	508		
Carbonate (CO_3).....	0	0		
Alkalinity as $CaCO_3$.....	412	417		
Sulfate (SO_4).....	20	24		
Chloride (Cl).....	62	71		
Fluoride (F).....	.7	1.1		
Nitrate (NO_3).....	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.52	.53		
Dissolved Solids.....	630	653		
Hardness as $CaCO_3$:				
Total.....	120	73		
Noncarbonate.....	0	0		
Specific conductance (micromhos at 25°C)....	920	940		
pH (units).....	7.7	7.6		
Temperature (°C).....	----------	----------		
Arsenic (As).....	.001	.000		
Barium (Ba).....	.000	.000		
Boron (B).....	.390	.400		
Cadmium (Cd).....	.001	.000		
Chromium (Cr).....	.000	.000		
Cobalt (Co).....	.000	.003		
Copper (Cu).....	.029	.005		
Lead (Pb).....	----------	----------		
Lithium (Li).....	.040	.037		
Mercury (Hg).....	----------	----------		
Strontium (Sr).....	.380	.240		
Zinc (Zn).....	.004	.007		

[a] Composite sample.

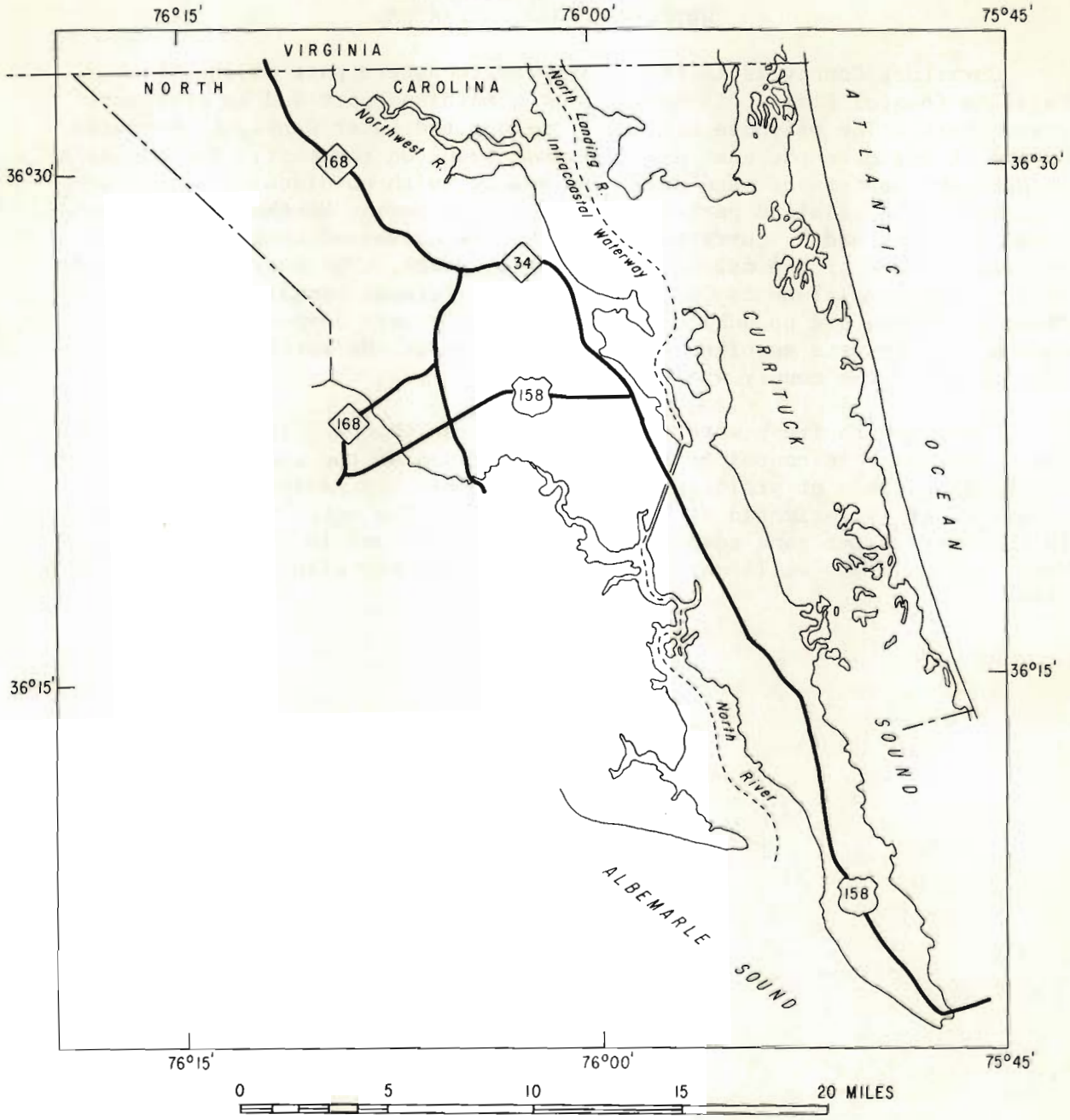
CURRITUCK COUNTY

WATER-RESOURCES APPRAISAL

Currituck County is in the extreme northeastern part of the North Carolina Coastal Plain. It consists of a mainland part and an offshore strand part. The offshore strand, a part of the Outer Banks, is bordered by the Atlantic on the east and Currituck Sound on the west. The strand's topogrpahy consists of sand dunes and swamps, with no discernible surface drainage. The mainland part is drained by the North, Northwest, and North Landing Rivers and by Currituck Sound. It is traversed by the Intracoastal Waterway. Much of the mainland consists of swamp. The average stream discharge on the mainland is 0.7 $(Mgal/d)/mi^2$. Streams usually go dry in drought. There are no public supplies in the county having 500 or more customers. Private supplies are obtained from ground water. The 1970 population of the county was 6,976.

The depth to fresh water is generally less than 100 feet in the county. The fresh water is contained in sands and clays of the upper sandy aquifer, which are capable of yielding up to 50 gal/min. The maximum available ground water is estimated at 1.0 $(Mgal/d)/mi^2$. The water from deeper wells in the fresh-water zone tends to be hard and may contain excessive iron. Water from shallow wells may be hard or soft and may also contain excessive iron.

CURRITUCK COUNTY

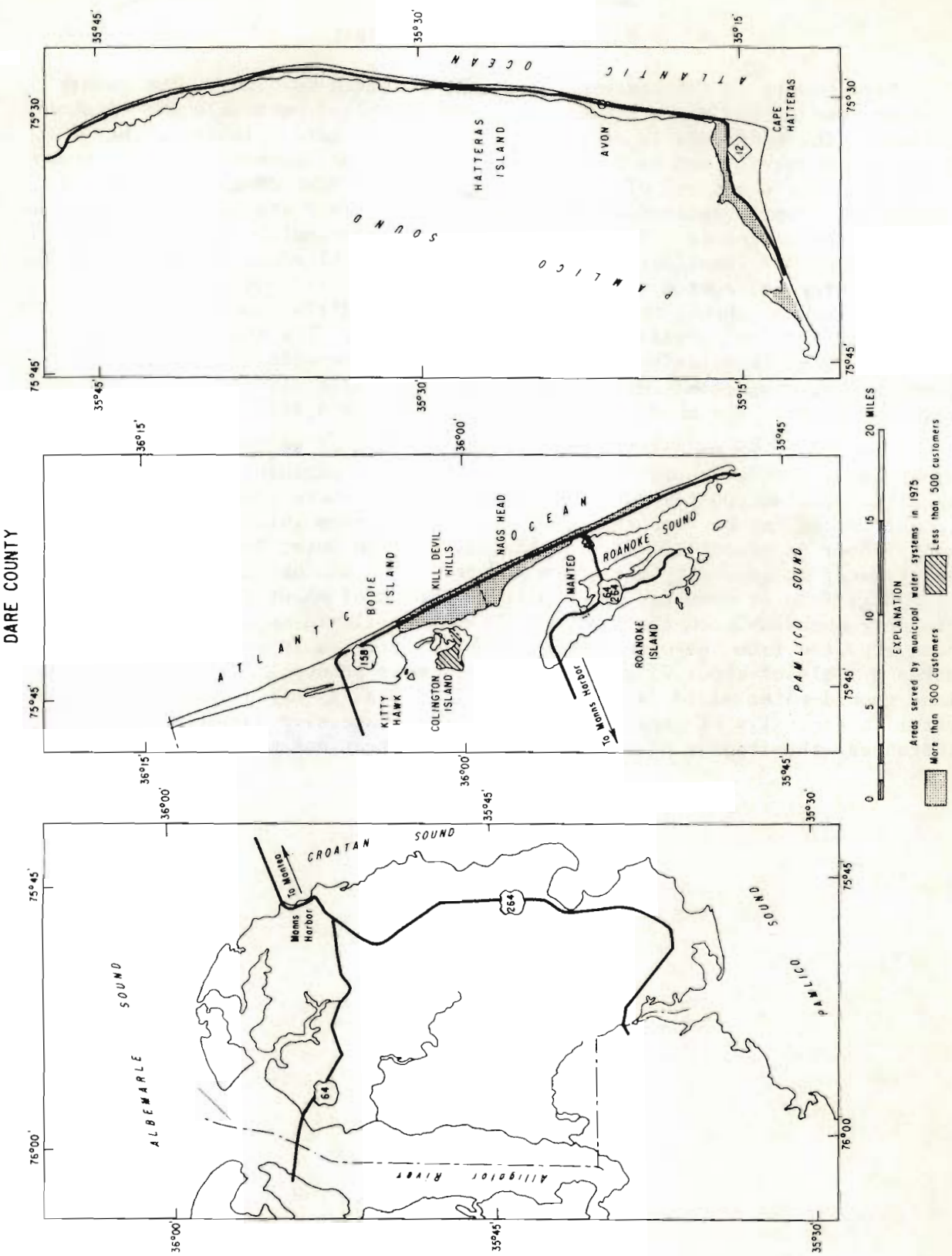


DARE COUNTY

WATER-RESOURCES APPRAISAL

Dare County is the easternmost county of North Carolina. The county is comprised of two major divisions, a wide mainland peninsula and offshore islands. The peninsula is separated from the offshore islands by the Croatan, Albemarle, and Pamlico Sounds. The western boundary of the county is formed by the estuary of the Alligator River. Most of the peninsula is swampy with poorly defined drainage. The few defined streams form estuaries in their lower reaches. The average streamflow for mainland Dare County is estimated at 0.7 (Mgal/d)/mi^2. There are three public water supplies in the county having 500 customers or more, all of which are on the offshore islands. Two of these, Nags Head and Kill Devil Hills, share the water from a lake and have an auxilliary ground-water supply. The other, the Cape Hatteras Water Association, uses a multiple shallow-well system. Other communities, commercial enterprises, and individuals also depend on ground-water supplies. The county population in 1970 was 6,995.

The county is underlain by thousands of feet of sediments, but only the upper sandy aquifer contains fresh water. On the peninsula, salt water is usually found at 200 feet or less, except in the shore areas where the depth to salt water may be less than 100 feet. On Roanoke Island the depth to salty water is almost 300 feet in places. On the Outer Banks the depth to salty water is generally less than 100 feet. On Roanoke Island well yields of 250 gal/min or more can be obtained. Yields of about 150 gal/min are probably obtainable on the peninsula. While well yields of 50 gal/min have been reported from the Outer Banks, the threat of salty-water intrusion makes a yield of about 25 gal/min per well more prudent. The maximum mainland ground-water yield is estimated at 1.0 (Mgal/d)/mi^2. The fresh ground water is generally of good quality except for excessive hardness. In some instances, the iron or dissolved-solids concentrations may also be excessive.


DARE COUNTY
ATLANTIC OCEAN
PAMLICO SOUND
HATTERAS ISLAND
AVON
CAPE HATTERAS
12
BODIE ISLAND
KILL DEVIL HILLS
NAGS HEAD
KITTY HAWK
COLINGTON ISLAND
158
MANTEO
ROANOKE SOUND
ROANOKE ISLAND
64
264
To Manns Harbor
CROATAN SOUND
To Morehead
Manns Harbor
ALBEMARLE SOUND
ALLIGATOR RIVER
75°45'
75°30'
75°15'
36°00'
35°45'
35°30'
35°15'
76°00'
0 5 10 15 20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
More than 500 customers
Less than 500 customers

CAPE HATTERAS WATER ASSOCIATION, DARE COUNTY

OWNERSHIP:

Water association. Total population supplied (1974), about 1,400 permanent; 3,600 seasonal (767 customers).

SOURCE:

Twenty wells (Nos. 3-22). The wells are numbered consecutively in ascending order, southwest to northeast.

Well No. 3, Da-426, located at lat 35°14'19", long 75°36'49". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 45.5 ft. Diam: 6 in. Cased to: 38.5 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.13 ft above mean sea level. Pump capacity: 15 gal/min. Type pump: submersible. Pump setting: about 21 ft.

Well No. 4, Da-427, located at lat 35°14'22", long 75°36'49". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 43.0 ft. Diam. 6 in. Cased to: 39.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.33 ft above mean sea level. Well yield: 21 gal/min. Pump capacity: 20 gal/min. Type of pump: centrifugal. Pump setting: about 21 ft.

Well No. 5, Da-428, located at lat 35°14'25", long 75°36'38". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 45.5 ft. Diam. 6 in. Cased to: 41.5 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.09 ft above mean sea level. Well yield: 18 gal/min. Pump capacity: 15 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 6, Da-429, located at lat 35°14'27", long 75°36'33". Driller: R. W. Magette. Data drilled: Feb. 1968. Total depth: 43.3 ft. Diam: 6 in. Cased to: 39.3 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.53 ft above mean sea level. Well yield: 17 gal/min. Pump capacity: 15 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 7, Da-430, located at lat 35°14'29", long 75°36'28". Driller: R. W. Magette. Date drilled: Mar. 1968. Total depth: 42.0 ft. Diam: 6 in. Cased to: 38.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.20 ft above mean sea level. Well yield: 19 gal/min. Pump capacity: 15 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 8, Da-431, located at lat 35°14'30", long 75°36'23". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 45.0 ft. Diam: 6 in. Cased to: 41.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.45 ft above mean sea level. Pump capacity: 20 gal/min. Type of pump: centrifugal. Pump setting: about 21 ft.

CAPE HATTERAS WATER ASSOCIATION, DARE COUNTY

Well No. 9, Da-432, located at lat 35°14'32", long 75°36'18". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 42.0 ft. Diam: 6 in. Cased to: 38.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.69 ft above mean sea level. Well yield: 20 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 10, Da-433, located at lat 35°14'34", long 75°36'12". Driller: R. W. Magette. Date drilled: Jan. 1968. Total depth: 41.0 ft. Diam: 6 in. Cased to: 37.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.23 ft above mean sea level. Well yield: 22 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 11, Da-434, located at lat 35°14'36", long 75°36'06". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 42.0 ft. Diam: 6 in. Cased to: 38.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.18 ft above mean sea level. Well yield: 24 gal/min. Pump capacity: 20 gal/min. Type of pump. submersible. Pump setting: about 21 ft.

Well No. 12, Da-435, located at lat 35°14'40", long 75°35'59". Driller: R. W. Magette. Date drilled: Feb. 1968. Total depth: 43.5 ft. Diam: 6 in. Cased to: 39.5 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.50 ft above mean sea level. Well yield: 22 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 13, Da-436, located at lat 35°14'42", long 75°35'54". Driller: R. W. Magette. Date drilled: Dec. 1967. Total depth: 43.2 ft. Diam: 6 in. Cased to: 39.2 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.06 ft above mean sea level. Well yield: 21 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 14, Da-437, located at lat 35°14'44", long 75°35'48". Driller: R. W. Magette. Date drilled: Dec. 1967. Total depth: 42.0 ft. Diam: 6 in. Cased to: 38.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.03 ft above mean sea level. Well yield: 16 gal/min. Pump capacity: 15 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 15, Da-438, located at lat 35°14'47", long 75°35'43". Driller: R. W. Magette. Date drilled: Dec. 1967. Total depth: 40.5 ft. Diam: 6 in. Cased to: 36.5 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.28 ft above mean sea level. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

CAPE HATTERAS WATER ASSOCIATION, DARE COUNTY

Well No. 16, Da-439, located at lat 35°14'18", long 75°35'35". Driller: R. W. Magette. Date drilled: Nov. 1967. Total depth: 41.0 ft. Diam: 6 in. Cased to: 37.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.66 ft above mean sea level. Well yield: 21 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 17, Da-440, located at lat 35°14'50", long 75°35'31". Driller: R. W. Magette. Date drilled: Nov. 1967. Total depth: 48.0 ft. Diam: 6 in. Cased to: 44.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 4.96 ft above mean sea level. Well yield: 23 gal/min. Pump capacity: 20 gal/min. Type of pump: centrifugal. Pump setting: about 21 ft.

Well No. 18, Da-441, located at lat 35°14'52", long 75°35'25". Driller: R. W. Magette. Date drilled: Dec. 1967. Total depth: 41.0 ft. Diam: 6 in. Cased to: 37.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.17 ft above mean sea level. Well yield: 20 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 19, Da-442, located at lat 35°14'53", long 75°35'20". Driller: R. W. Magette. Date drilled: Dec. 1967. Total depth: 45.0 ft. Diam: 6 in. Cased to: 41.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.26 ft above mean sea level. Well yield: 22 gal/min. Pump capacity: 20 gal/min. Type of pump: centrifugal. Pump setting: about 21 ft.

Well No. 20, Da-443, located at lat 35°14'54", long 75°35'15". Driller: R. W. Magette. Date drilled: Nov. 1967. Total depth: 48.0 ft. Diam: 6 in. Cased to: 44.0 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.24 ft above mean sea level. Well yield: 21 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 21, Da-444, located at lat 35°14'56", long 75°35'08". Driller: R. W. Magette. Date drilled: Nov. 1967. Total depth 43.6 ft. Diam: 6 in. Cased to: 39.6 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.00 ft above mean sea level. Well yield: 22.5 gal/min. Pump capacity: 20 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

Well No. 22, Da-445, located at lat 35°14'57", long 75°35'04". Driller: R. W. Magette. Date drilled: Nov. 1967. Total depth: 45.8 ft. Diam: 6 in. Cased to: 41.8 ft. Type of finish: screened (gravel-packed). Topography: flat. Aquifer: upper sandy. Static water level: 5.25 ft above mean sea level. Pump capacity: 15 gal/min. Type of pump: submersible. Pump setting: about 21 ft.

TOTAL USE:

Average (1974), 0.19 Mgal/d, metered; maximum daily, (August, 1973), 0.41 million gallons.

CAPE HATTERAS WATER ASSOCIATION, DARE COUNTY

INDUSTRIAL USE:

None.

TREATMENT:

Aeration, prechlorination, coagulation with alum and lime, pressure sand filtration, sedimentation, zeolite process for softening, and post-chlorination.

RATED CAPACITY OF TREATMENT PLANT:

1.0 Mgal/d.

PUMPING CAPACITY:

Raw water 0.5 Mgal/d; finished water, 1.0 Mgal/d.

RAW-WATER STORAGE:

One ground storage tank, 200,000 gallons.

FINISHED-WATER STORAGE:

Two elevated tanks, 100,000 and 200,000 gallons; one ground storage tank, 200,000 gallons.

FUTURE PLANS:

To provide for 300 more users, primarily at Avon, 15 more wells, a 200,000-gallon finished water tank at the plant, a 100,000-gallon elevated tank at Avon, and a booster pump between the plant and Avon.

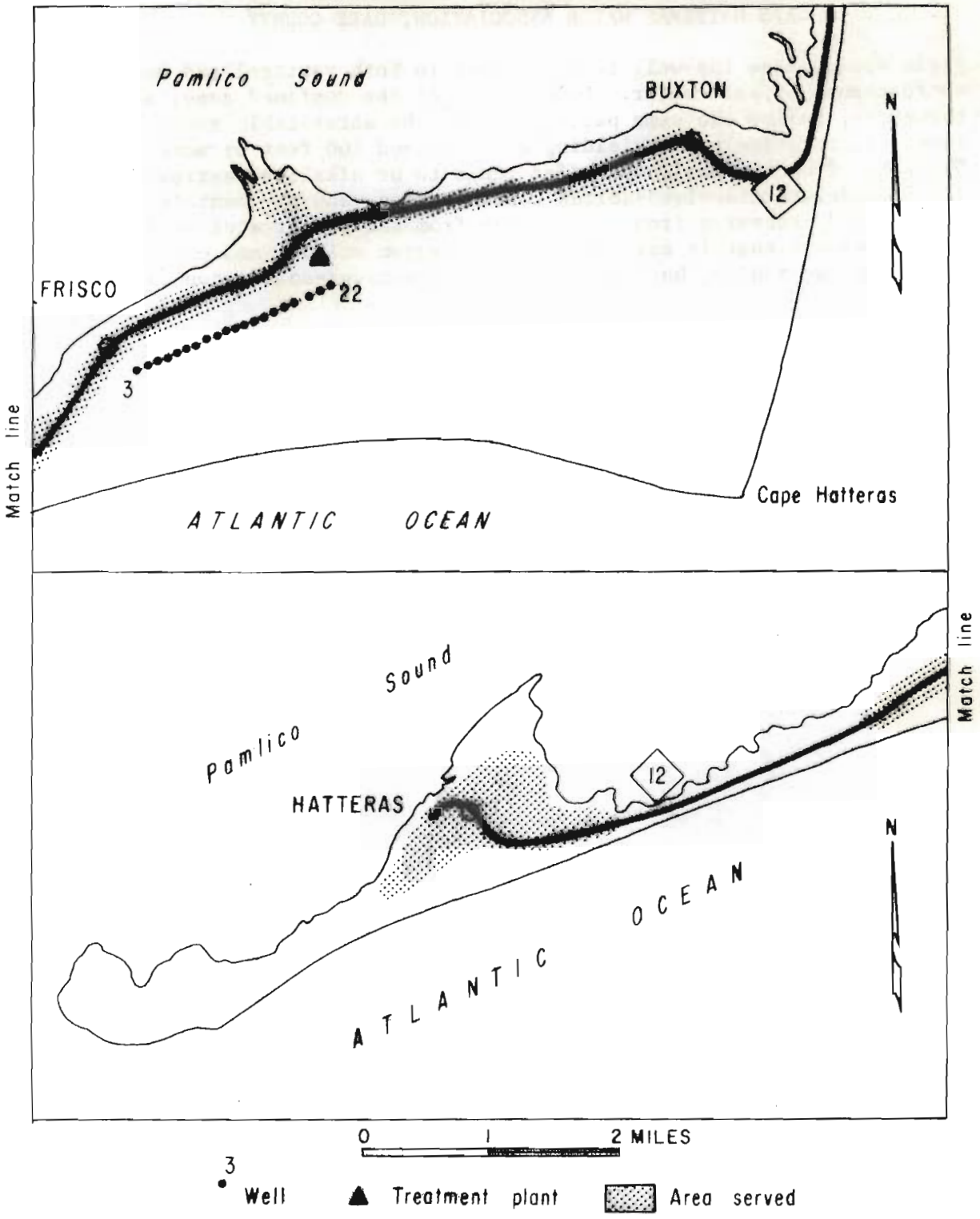
WATER-RESOURCES APPRAISAL:

Surface water: The communities of Buxton, Frisco, and Hatteras are served by the Cape Hatteras Water Association and are located on the southern part of Hatteras Island. There, the topography is flat except for sand dunes, most of which are on the Atlantic Ocean side of the island. Swamps predominate on the Pamlico Sound side of the island. Owing to the ability of the dunes to soak up large amounts of precipitation, there are few discernible streams in the dune areas. The few drains in the swampy areas near the south are estuarine, and contain salty water most of the time. There are a few fresh-water swamps between dune areas. There is probably no practical means of developing a large surface-water supply in this area.

Ground water: The dunes soak up and store much of the precipitation. However, the fresh water is underlain by salty water. The depth to salt water in the upper sandy aquifer varies from virtually zero at the shoreline to a little over 100 feet at the center of the island. Within the upper sandy aquifer there is a shallow water-table zone having a thickness of about 30 to 50 feet. The water association presently uses this zone for its shallow well system. Beneath the water-table zone there is a confining layer about 10 feet thick underlain by a confined permeable zone of about 20 feet in thickness. Wells in the confined zone could probably yield in excess of 100 gal/min. However, such a

yield would cause the well to be subject to both vertical and horizontal encroachment by salt water. Development of the confined zone, should, therefore, follow the same pattern as for the water-table zone; that is, numerous, relatively low-yielding wells spaced 100 feet or more apart. The water from the shallow aquifer tends to be alkaline, extremely hard, with a moderate dissolved-solids concentration, and may contain hydrogen sulfide and excessive iron. The water from the deeper aquifer is similar except that it may be free of hydrogen sulfide and excessive iron, but has a high, but not excessive, dissolved-solids concentration.

CAPE HATTERAS WATER ASSOCIATION



CAPE HATTERAS, DARE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished)	Composite of Wells Finished			
Date of collection	7-17-74			
Silica (SiO_2)	11			
Iron (Fe)	.060			
Manganese (Mn)	.160			
Calcium (Ca)	69			
Magnesium (Mg)	6.6			
Sodium (Na)	61			
Potassium (K)	3.2			
Bicarbonate (HCO_3)	285			
Carbonate (CO_3)	0			
Alkalinity as $CaCO_3$	234			
Sulfate (SO_4)	6.3			
Chloride (Cl)	60			
Fluoride (F)	.6			
Nitrate (NO_3)	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	.01			
Dissolved Solids	359			
Hardness as $CaCO_3$:				
Total	200			
Noncarbonate	0			
Specific conductance (micromhos at 25°C)	602			
pH (units)	7.5			
Temperature (°C)	----------			
Arsenic (As)	.001			
Barium (Ba)	.000			
Boron (B)	.060			
Cadmium (Cd)	.001			
Chromium (Cr)	.001			
Cobalt (Co)	.000			
Copper (Cu)	.002			
Lead (Pb)	----------			
Lithium (Li)	.014			
Mercury (Hg)	----------			
Strontium (Sr)	.380			
Zinc (Zn)	.020			

KILL DEVIL HILLS, DARE COUNTY

OWNERSHIP:

Municipal. Supplies Colington Island. Total population supplied varies from about 400 in the winter to about 6,000 during the summer tourist season (1,440 metered customers).

SOURCE:

Fresh pond. The intake is at the plant which is on the east shore of the lake about 200 feet north of the Kill Devil Hills-Nags Head town limits at lat 35°59'32", long 75°39'18".

RAW-WATER STORAGE:

Fresh pond, reported capacity is 96 million gallons.

ALLOWABLE DRAFT:

The lake is inadequate to meet the combined needs of the Nags Head and Kill Devil Hills water system during the tourist season. Eighteen shallow, screened, driven wells within the Nags Head town limits and tapping the upper sandy aquifer supply 0.5 Mgal/d to the lake during the peak season. The total supply is barely adequate.

TOTAL USE:

Average (July 1973 - June 1974) 0.336 Mgal/d, metered; maximum daily (7-5-74) 0.771 million gallons.

Average daily water use (Mgal/d), July 1973 - June 1974

July 1973--0.627	Nov. 1973--0.258	Mar. 1974--0.162
Aug. 1973--0.651	Dec. 1973--0.177	Apr. 1974--0.283
Sept. 1973--0.437	Jan. 1974--0.159	May 1974--0.338
Oct. 1973--0.349	Feb. 1974--0.139	June 1974--0.434

INDUSTRIAL USE:

0.003 Mgal/d, estimated.

TREATMENT:

Ground water discharged to lake: aeration. Lake water: microfiltration, prechlorination, coagulation with alum, sedimentation, adjustment of pH with lime, postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

0.72 Mgal/d.

PUMPING CAPACITY:

Raw water: 0.72 Mgal/d; finished water: 1.08 Mgal/d.

FINISHED-WATER STORAGE:

One elevated tank: 200,000 gallons; one ground storage tank: 220,000 gallons.

FUTURE PLANS:

Lake will be dredged to increase capacity.

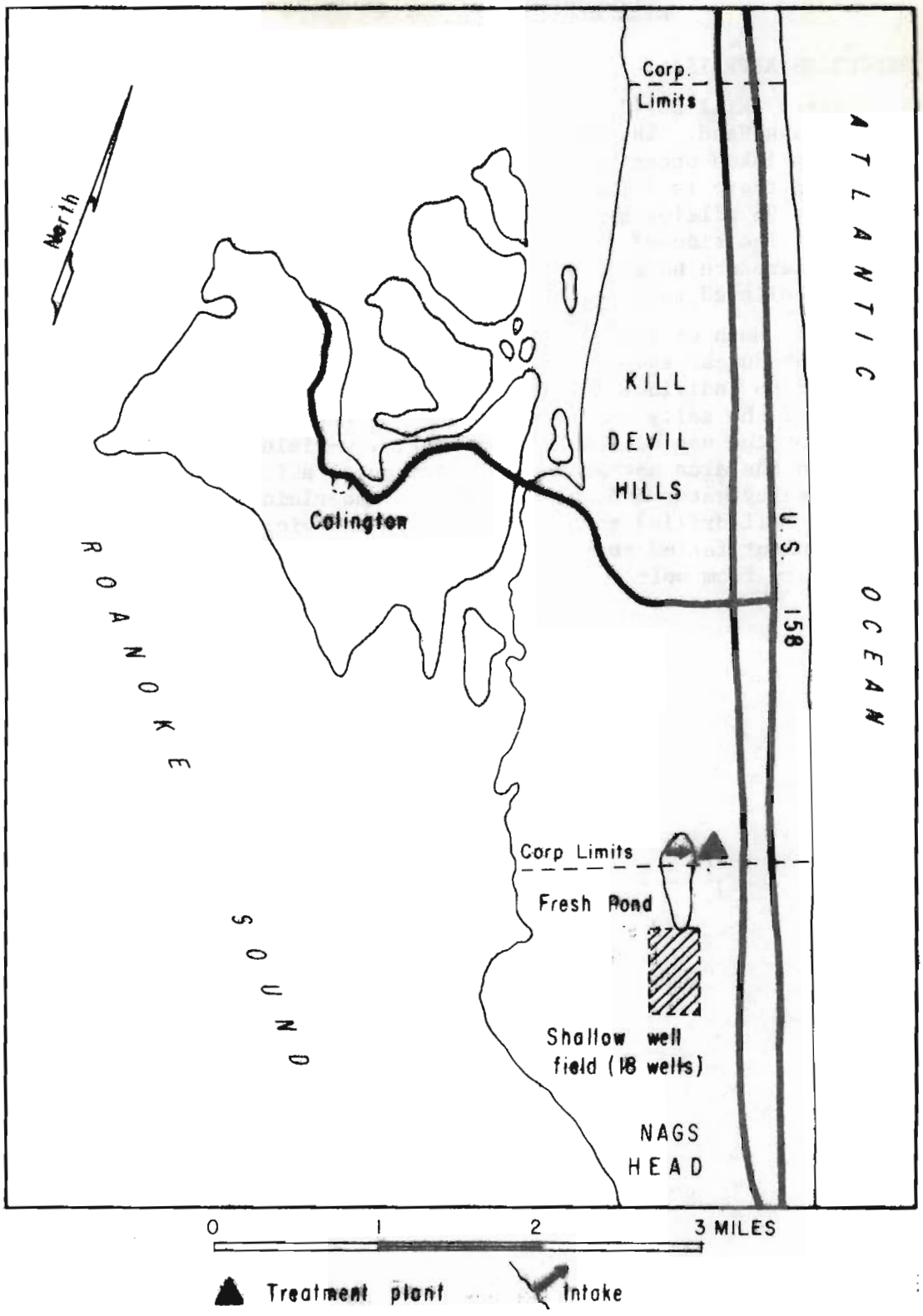
KILL DEVIL HILLS, DARE COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Kill Devil Hills is located on Bodie Island between Kitty Hawk and Nags Head. The area is flat except for sand dunes. Small fresh-water lakes occur between some of the sand dunes. At the southern end of town there is a lake, called Fresh Pond. It has a reported capacity of 96 million gallons. This source of water is shared with Nags Head. The side of the island toward the sound has extensive swamps. There are no well-defined streams in the area. Surface-water runoff is believed to be virtually nonexistent in the dune areas.

Ground water: Much of the precipitation is captured by the dunes. The sands of the dunes beneath the island could yield large supplies of fresh water to individual wells if it were not for the threat of upward migration of the salty water that underlies the fresh water. This necessitates the use of numerous shallow, low-yielding wells. Test drilling in the area has shown the presence of a fresh-water aquifer below the salty water and which is itself underlain by salty water. However, a well drilled to this aquifer in the vicinity of the water-treatment plant failed to yield fresh water. The shallow fresh water tends to vary from soft to hard and may contain excessive iron.

TOWN OF KILL DEVIL HILLS



KILL DEVIL HILL, DARE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Fresh Pond Raw	Fresh Pond Finished		
Date of collection.....	7-17-74	7-18-74		
Silica (SiO_2).....	12	11		
Iron (Fe).....	.030	.000		
Manganese (Mn).....	.005	.025		
Calcium (Ca).....	19	21		
Magnesium (Mg).....	4.1	4.1		
Sodium (Na).....	16	16		
Potassium (K).....	3.1	2.5		
Bicarbonate (HCO_3).....	68	57		
Carbonate (CO_3).....	0	0		
Alkalinity as $CaCO_3$.....	56	47		
Sulfate (SO_4).....	5.9	11		
Chloride (Cl).....	25	32		
Fluoride (F).....	.3	.0		
Nitrate (NO_3).....	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.88	.01		
Dissolved Solids.....	123	126		
Hardness as $CaCO_3$:				
Total.....	65	69		
Noncarbonate.....	9	23		
Specific conductance (micromhos at 25°C)....	205	216		
pH (units).....	7.9	7.1		
Temperature (°C).....	----------	----------		
Arsenic (As).....	.004	.001		
Barium (Ba).....	.000	.000		
Boron (B).....	.040	.040		
Cadmium (Cd).....	.001	.000		
Chromium (Cr).....	.000	.001		
Cobalt (Co).....	.000	.000		
Copper (Cu).....	.006	.002		
Lead (Pb).....	.000	.002		
Lithium (Li).....	.007	.000		
Mercury (Hg).....	.0006	.0004		
Strontium (Sr).....	.150	.100		
Zinc (Zn).....	.010	.020		

NAGS HEAD, DARE COUNTY

OWNERSHIP:

Municipal. Total population supplied varies from about 550 during the winter to about 6,000 during the summer tourist season (970 customers).

SOURCE:

Fresh Pond. The intake is at the plant which is on the east shore of the lake about 100 feet south of the Nags Head-Kill Devil Hills town limits at lat 35°59'30", long 75°39'17". The lake's natural supply is augmented during peak season by 0.5 Mgal/d of ground water from 18 screened, driven wells, 30-35 feet deep, located near the south end of the lake, tapping the upper sandy aquifer.

Well No. 1, Da-499, located at lat 35°53'18", long 75°37'18". Driller: Carolina Well and Pump Co. Date drilled: Aug. 1973. Total depth: 215 ft. Diam: 8 in. Cased to: 194 ft. Type of finish: screened. Screened interval: 194-215 ft. Topography: swamp. Aquifer: upper sandy. Static water level: 4 ft below land surface. Well yield: 250 gal/min. Pump capacity: 250 gal/min. Type pump: turbine.

RAW-WATER STORAGE:

Fresh Pond, reported capacity is 96 million gallons.

ALLOWABLE DRAFT:

The lake is inadequate to meet the combined needs of the Nags Head and Kill Devil Hills water systems during the tourist season. The shallow well system supplies 0.5 Mgal/d to the lake during the peak season. The total supply is barely adequate.

TOTAL USE:

Average (July 1973 - June 1974) 0.27 Mgal/d, metered.

Average daily water use (Mgal/d), July 1973 - June 1974

July 1973--0.659	Nov. 1973--0.145	Mar. 1974--0.115
Aug. 1973--0.618	Dec. 1973--0.093	Apr. 1974--0.190
Sept. 1973--0.346	Jan. 1974--0.049	May 1974--0.280
Oct. 1973--0.225	Feb. 1974--0.052	June 1974--0.451

INDUSTRIAL USE:

0.003 Mgal/d, estimated.

TREATMENT:

Microfiltration, prechlorination, coagulation with alum, sedimentation, adjustment of pH with lime, postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

0.72 Mgal/d.

NAGS HEAD, DARE COUNTY

PUMPING CAPACITY:

Ground water: Well no. 1, 0.36 Mgal/d; shallow well-point system, 0.5 Mgal/d.

Surface water: Raw water, 0.72 Mgal/d; finished water, 0.72 Mgal/d.

FINISHED-WATER STORAGE:

One elevated tank: 300,000 gallons; one ground storage tank: 500,000 gallons.

FUTURE PLANS:

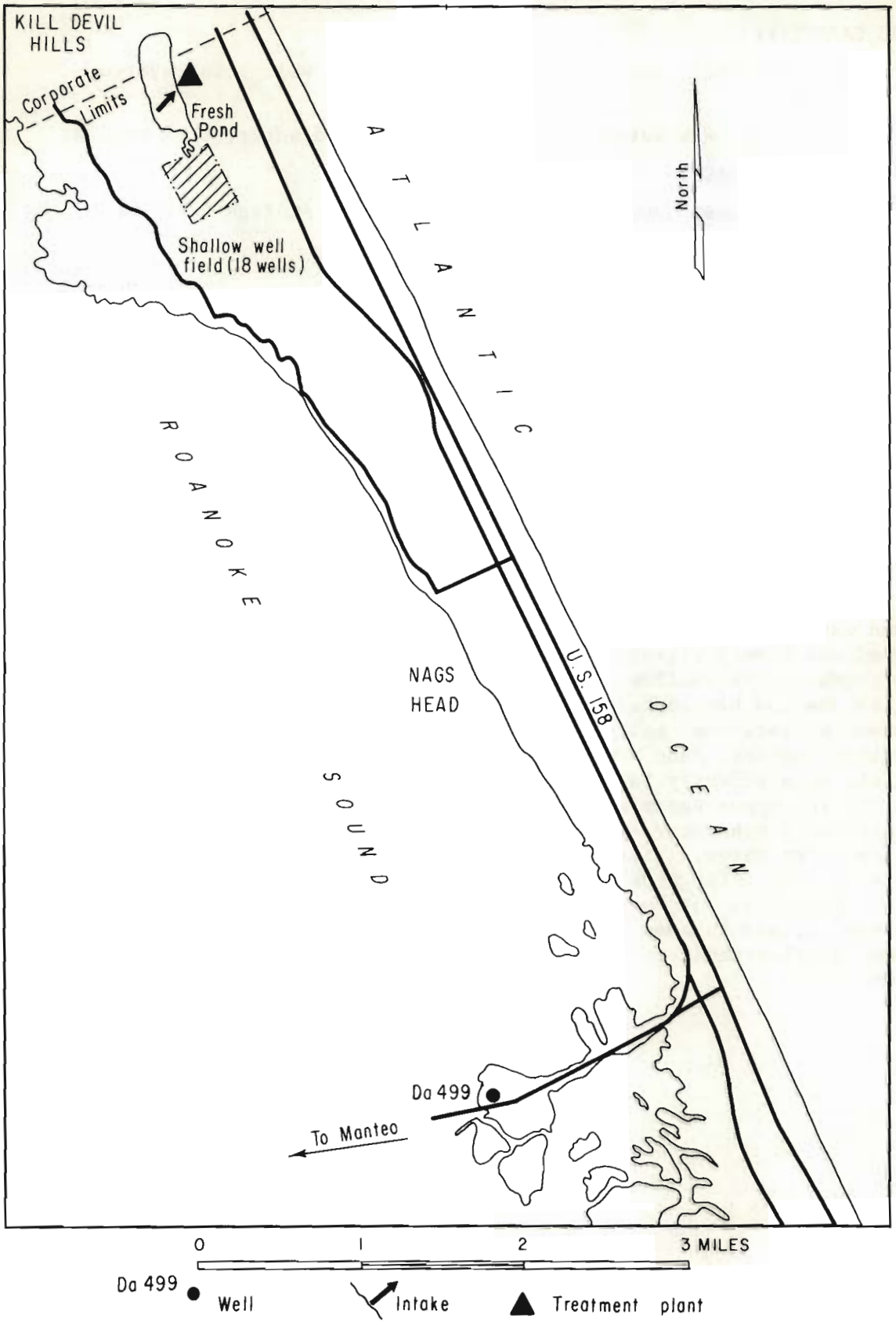
Lake will be dredged to increase capacity.

WATER-RESOURCES APPRAISAL:

Surface water: Nags Head is located in the southern part of Bodie Island in eastern Dare County. It has a flat topography except where sand dunes are found. There are swamps in the northern and southern part of town on the Pamlico Sound side of the island. There is virtually no surface-water runoff in the non-swampy part of the town. There are several small lakes between dunes in the northern part of town. Here there is also a large lake, Fresh Pond, which contains a reported 96 million gallons. This water is shared with the town of Kill Devil Hills.

Ground water: Much of the rainfall in the dune areas is temporarily captured and slowly migrates toward the ocean to discharge. The best way to capture this shallow water is by numerous low-yielding vertical wells or by shallow horizontal wells, thereby minimizing the possibility of upward migration of salty water to the well intakes. In the southern part of the Nags Head area and to the west on Roanoke Island there exists an apparently large supply of fresh water in a confined zone within the upper sandy aquifer. In some areas, a well might first penetrate fresh-water, then salty water and again fresh water, then again salty water. Yields of up to 250 gal/min have been obtained from this aquifer. The problem with this aquifer is not its ability to yield water to wells, but the threat of salt-water intrusion, from below, laterally, and in some cases, from above. The water from the upper sandy aquifer tends to vary from soft to hard and may contain excessive iron.

TOWN OF NAGS HEAD



NAGS HEAD, DARE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Fresh Pond Raw	Fresh Pond Finished	Well No. 1 Raw	
Date of collection.....	7-17-74	7-17-74	7-17-74	
Silica (SiO_2).....	12	11	25	
Iron (Fe).....	.030	.000	.280	
Manganese (Mn).....	.005	.040	.410	
Calcium (Ca).....	19	19	24	
Magnesium (Mg).....	4.1	4.1	4.5	
Sodium (Na).....	16	16	170	
Potassium (K).....	3.1	2.0	9.7	
Bicarbonate (HCO_3).....	68	48	413	
Carbonate (CO_3).....	0	0	0	
Alkalinity as $CaCO_3$.....	56	39	339	
Sulfate (SO_4).....	5.9	16	2.3	
Chloride (Cl).....	25	31	96	
Fluoride (F).....	.3	.1	.4	
Nitrate (NO_3).....	----------	----------	----------	
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.88	.01	.01	
Dissolved Solids.....	123	123	536	
Hardness as $CaCO_3$:				
Total.....	65	65	79	
Noncarbonate.....	9	25	0	
Specific conductance (micromhos at 25°C)....	205	207	893	
pH (units).....	7.9	7.0	7.7	
Temperature (°C).....	----------	----------	----------	
Arsenic (As).....	.004	.001	.000	
Barium (Ba).....	.000	.000	.000	
Boron (B).....	.040	.030	1.000	
Cadmium (Cd).....	.001	.001	.001	
Chromium (Cr).....	.000	.001	.000	
Cobalt (Co).....	.000	.002	.000	
Copper (Cu).....	.006	.003	.002	
Lead (Pb).....	.000	.000	----------	
Lithium (Li).....	.007	.007	.007	
Mercury (Hg).....	.0006	.0001	----------	
Strontium (Sr).....	.150	.150	.200	
Zinc (Zn).....	.010	.190	.005	

EDGECOMBE COUNTY

WATER-RESOURCES APPRAISAL

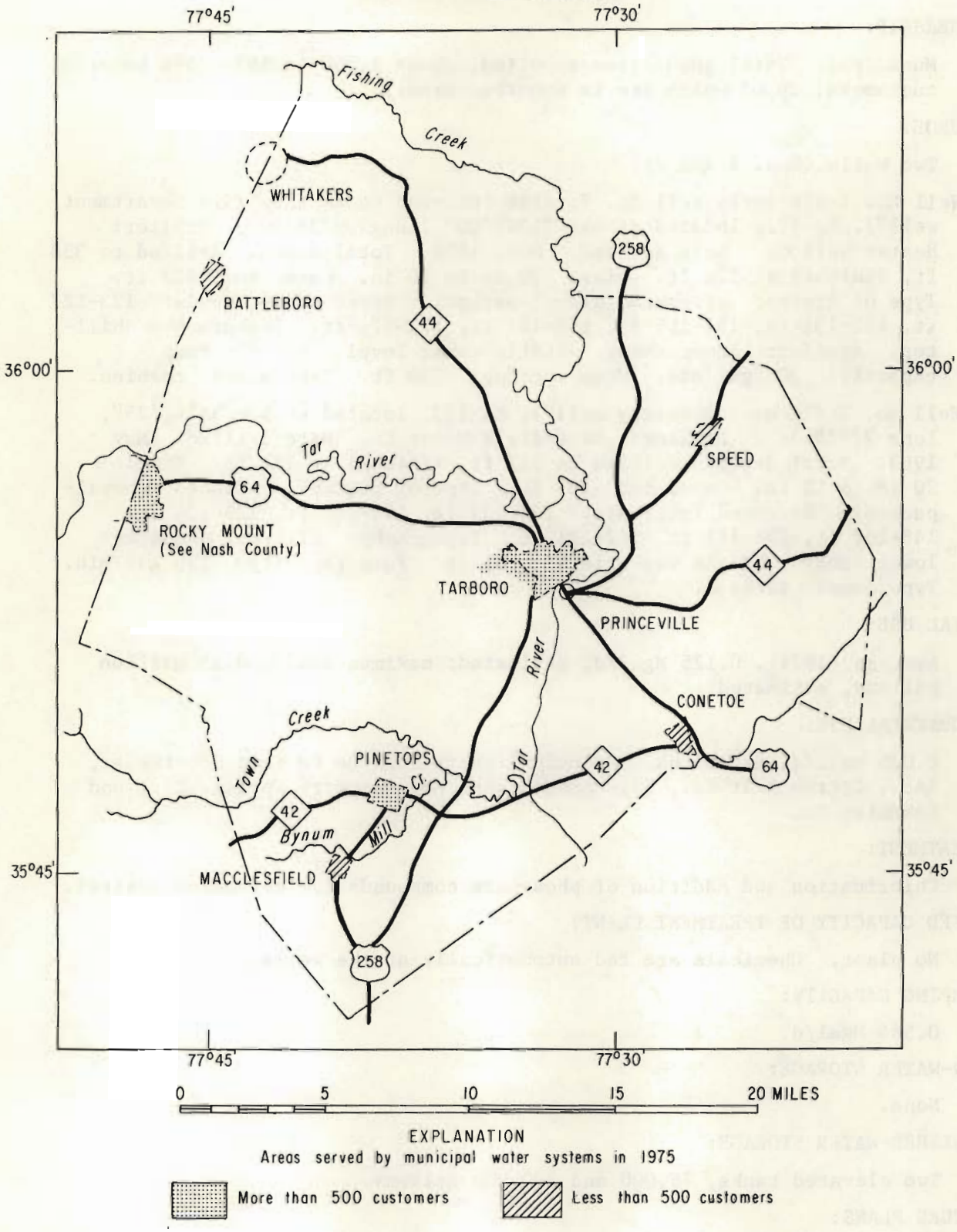
Edgecombe County is in the northwestern part of the Coastal Plain. The topography is flat to moderately rolling. Swamps are common in the valleys. The county is drained by the Tar River and its tributaries. There is virtually no regulation of the streams. The average flow of the streams range from 0.65 to 0.84 $(Mgal/d)/mi^2$. Minimum flows of unregulated streams range from zero to 0.019 $(Mgal/d)/mi^2$ and average 0.0053 $(Mgal/d)/mi^2$. The 7-day, 2-year low flow averages 0.032 $(Mgal/d)/mi^2$. Streams with drainage areas up to 150 square miles occasionally go dry. Only two of the public water supplies in the county have 500 or more customers. Of these, Tarboro obtains its water from the Tar River and Pinetops obtains its water from deep wells.

The surface of the county is underlain by clays and sands of the upper sandy aquifer. The thickness of this aquifer ranges from virtually zero to about 100 feet. This aquifer will probably yield less than 50 gal/min to wells at most places. It is underlain by crystalline rocks in the western part of the county and is underlain by the lower sandy aquifer in the central and eastern parts of the county. Well-yields of up to 110 gal/min have been reported from the crystalline rocks. More-typical yields are under 25 gal/min. The lower sandy aquifer consists primarily of clays and sands and is capable of yielding 200, and perhaps 300 gal/min, where sufficiently thick and sandy, such as in the eastern part of the county. The lower sandy aquifer does not occur in the western part of the county.

The water from the crystalline rocks ranges from soft to moderately hard and commonly contains excessive iron. The water from the lower sandy aquifer is similar, except that it tends to be very soft at depth.

Well yields that are adequate for domestic use or for small industrial- or public-supply needs are obtainable throughout the county. Where the lower sandy aquifer is sufficiently thick, much larger water needs can be satisfied. The average amount of ground water that is available in the county is 0.79 $(Mgal/d)/mi^2$. The estimated maximum recharge rate for the lower sandy aquifer is 0.05 $(Mgal/d)/mi^2$.

EDGECOMBE COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

Less than 500 customers

PINETOPS, EDGECOMBE COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 1,500 in 1974 (596 metered customers, 20 of which are in suburban areas).

SOURCE:

Two Wells (Nos. 1 and 2).

Well No. 1 (formerly Well No. 7; also referred to as the "fire department well"), Ed-122, located at lat 35°47'20", long 77°38'20". Driller: Heater Well Co. Date drilled: Nov. 1956. Total depth: drilled to 338 ft, finished at 176 ft. Diam: 20 in to 10 in. Cased to: 123 ft. Type of finish: screened (gravel-packed). Screened intervals: 123-127 ft, 132-136 ft, 152-155 ft, 158-167 ft, 172-176 ft. Topography: hilltop. Aquifer: lower sandy. Static water level: 54 ft. Pump capacity: 200 gal/min. Pump setting: 130 ft. Type pump: turbine.

Well No. 2 ("school property well"), Ed-123, located at lat 35°47'23", long 77°38'36". Driller: Hartsfield Water Co. Date drilled: May 1963. Total depth: drilled to 317 ft, finished at 171 ft. Diam: 20 in to 10 in. Cased to: 105 ft. Type of finish: screened (gravel-packed). Screened intervals: 105-109 ft, 114-122 ft, 126-134 ft, 148-152 ft, 156-164 ft, 167-171 ft. Topography: Hilltop. Aquifer: lower sandy. Static water level: 51 ft. Pump capacity: 190 gal/min. Type pump: turbine.

TOTAL USE:

Average (1974), 0.125 Mgal/d, estimated; maximum daily, 0.15 million gallons, estimated.

INDUSTRIAL USE:

0.025 Mgal/d, estimated. Principal users include Puritan Sportswear, Inc., Cotton Belt Co., Edgecombe Casket Co., Hickory Springs Co., and Boxmaker Co.

TREATMENT:

Chlorination and addition of phosphate compounds for corrosion control.

RATED CAPACITY OF TREATMENT PLANT:

No plant. Chemicals are fed automatically at the wells.

PUMPING CAPACITY:

0.564 Mgal/d.

RAW-WATER STORAGE:

None.

FINISHED-WATER STORAGE:

Two elevated tanks, 75,000 and 200,000 gallons.

FUTURE PLANS:

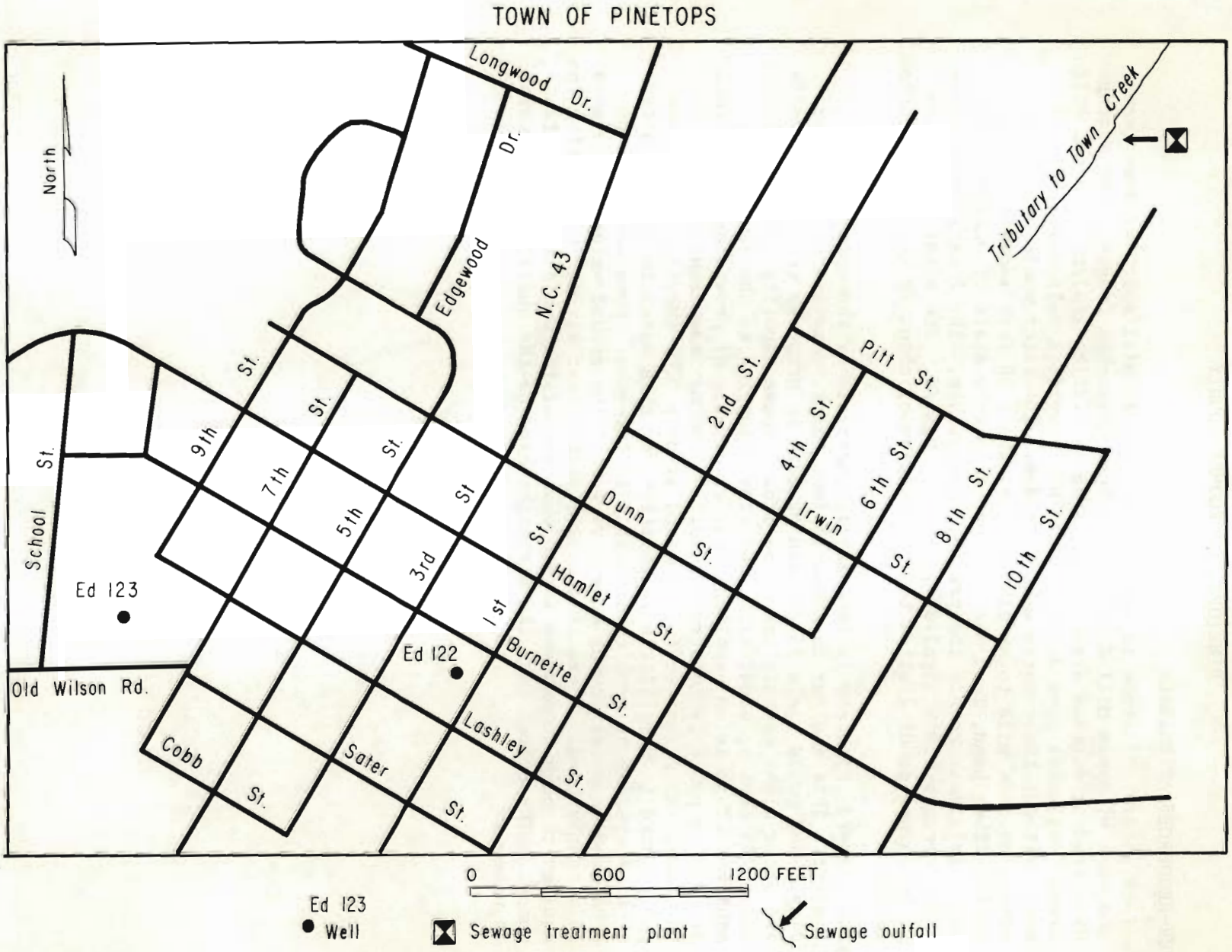
To put a newly drilled well into the system.

PINETOPS, EDGECOMBE COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Pinetops is located on a gentle hill south of Town Creek and west of Bynum Mill Creek in southern Edgecombe County. The average discharge of streams draining the area is 0.7 $(Mgal/d)/mi^2$. Bynum Mill Creek frequently goes dry and could not provide a reliable supply of water without the construction of a dam. The water would have to be pumped about a mile to an elevation of about 50 feet above the creek. On the other hand, Town Creek has an allowable draft of 0.22 Mgal/d, which is almost double the present average use. The 7-day, 2-year low-flow averages 0.019 $(Mgal/d)/mi^2$ or 3.6 Mgal/d. The water would have to be pumped about 2 miles to an elevation of about 70 feet above stream level.

Ground water: Pinetops is immediately underlain by the upper sandy aquifer. This aquifer is about 85 feet thick, consists of sands and clays, and could yield 25 gal/min or more to properly constructed wells. The water might contain excessive iron. These deposits are underlain by about 235 feet of sand, silt, and clay belonging to the lower sandy aquifer. This is an excellent aquifer capable of providing 200 gal/min or more to properly constructed wells. The maximum areal recharge to the lower sandy aquifer is estimated at only 0.05 $(Mgal/d)/mi^2$. However, there is very little competition for this water in the vicinity of Pinetops, so no problem of supply is foreseen. Some wells in the area produce water having excessive iron. The ground water in the area is slightly hard. There is some indication that air may be entering the aquifer through an exposed screen when one of the municipal wells is pumped. The effect that the air might have on the quality of the water is unknown.


TOWN OF PINETOPS
Longwood Dr.
Edgewood Dr.
N.C. 43
Tributary to Town Creek
North
School St.
9th St.
7th St.
5th St.
3rd St.
1st St.
2nd St.
4th St.
6th St.
8th St.
10th St.
Pitt St.
Dunn St.
Irwin St.
Hamlet St.
Burnette St.
Lashley St.
Sater St.
Cobb St.
Old Wilson Rd.
Ed 123
Ed 122
0 600 1200 FEET
Ed 123
Well
Sewage treatment plant
Sewage outfall

PINETOPS, EDGECOMBE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 1 Finished	Wells 1,2[a] Finished
Date of collection.....	5-21-62	5-21-62	9-27-74
Silica (SiO_2).....	31	32	33
Iron (Fe).....	.61	.22	.060
Manganese (Mn).....	.05	.2	.045
Calcium (Ca).....	23	23	24
Magnesium (Mg).....	3.7	4.1	3.2
Sodium (Na).....	12	13	13
Potassium (K).....	5.0	5.0	4.2
Bicarbonate (HCO_3).....	111	110	106
Carbonate (CO_3).....	0	0	0
Alkalinity as $CaCO_3$.....	91	90	87
Sulfate (SO_4).....	6.8	7.2	8.8
Chloride (Cl).....	3.3	4.2	4.2
Fluoride (F).....	.3	.2	.2
Nitrate (NO_3).....	.0	.0	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	.01
Dissolved Solids.....	142	146	143
Hardness as $CaCO_3$:			
Total.....	74	74	73
Noncarbonate.....	0	0	0
Specific conductance (micromhos at 25°C)....	207	210	186
pH (units).....	7.4	7.5	7.1
Temperature (°C).....	17	----------	----------
Arsenic (As).....	----------	----------	.000
Barium (Ba).....	----------	----------	.000
Boron (B).....	----------	----------	.070
Cadmium (Cd).....	----------	----------	.001
Chromium (Cr).....	----------	----------	.000
Cobalt (Co).....	----------	----------	.000
Copper (Cu).....	----------	----------	.006
Lead (Pb).....	----------	----------	----------
Lithium (Li).....	----------	----------	.000
Mercury (Hg).....	----------	----------	----------
Strontium (Sr).....	----------	----------	.150
Zinc (Zn).....	----------	----------	.050

[a] Composite sample.

TARBORO, EDGECOMBE COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 10,000 in 1974 (3,240 metered customers, about 70 of whom are in suburban areas).

SOURCE:

Tar River. The intakes are about 1/4 mile north of the Main Street bridge at lat 35°53'43", long 77°31'45". The drainage area at the intake is 2,140 square miles, approximately.

RAW-WATER STORAGE:

None.

ALLOWABLE DRAFT:

Estimated allowable draft is 35 Mgal/d without storage.

TOTAL USE:

Average (1973), 1.29 Mgal/d metered; maximum daily (4-10-73), 2.18 million gallons.

INDUSTRIAL USE:

0.50 Mgal/d. Principal users include Glenoit Mills, Inc., Phoenix Trimming Co., Klopman Mills, Inc., Mayo Knitting Mills, Inc., Runnymede Mills, Inc., and Black and Decker Manufacturing Co.

TREATMENT:

Prechlorination, coagulation with alum and caustic soda, sedimentation, rapid sand filtration, adjustment of pH with caustic soda, post-chlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

3.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 3.0 Mgal/d; finished water, 3.0 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 1,100,000 gallons; 3 elevated tanks, 500,000, 200,000 and 200,000 gallons.

FUTURE PLANS:

To increase treatment plant capacity to 6 Mgal/d within the next 3 years. Plans are to include Brentwood and Hope Lodge subdivisions and the town of Princeville in the system. A line will be laid for a new major industrial user.

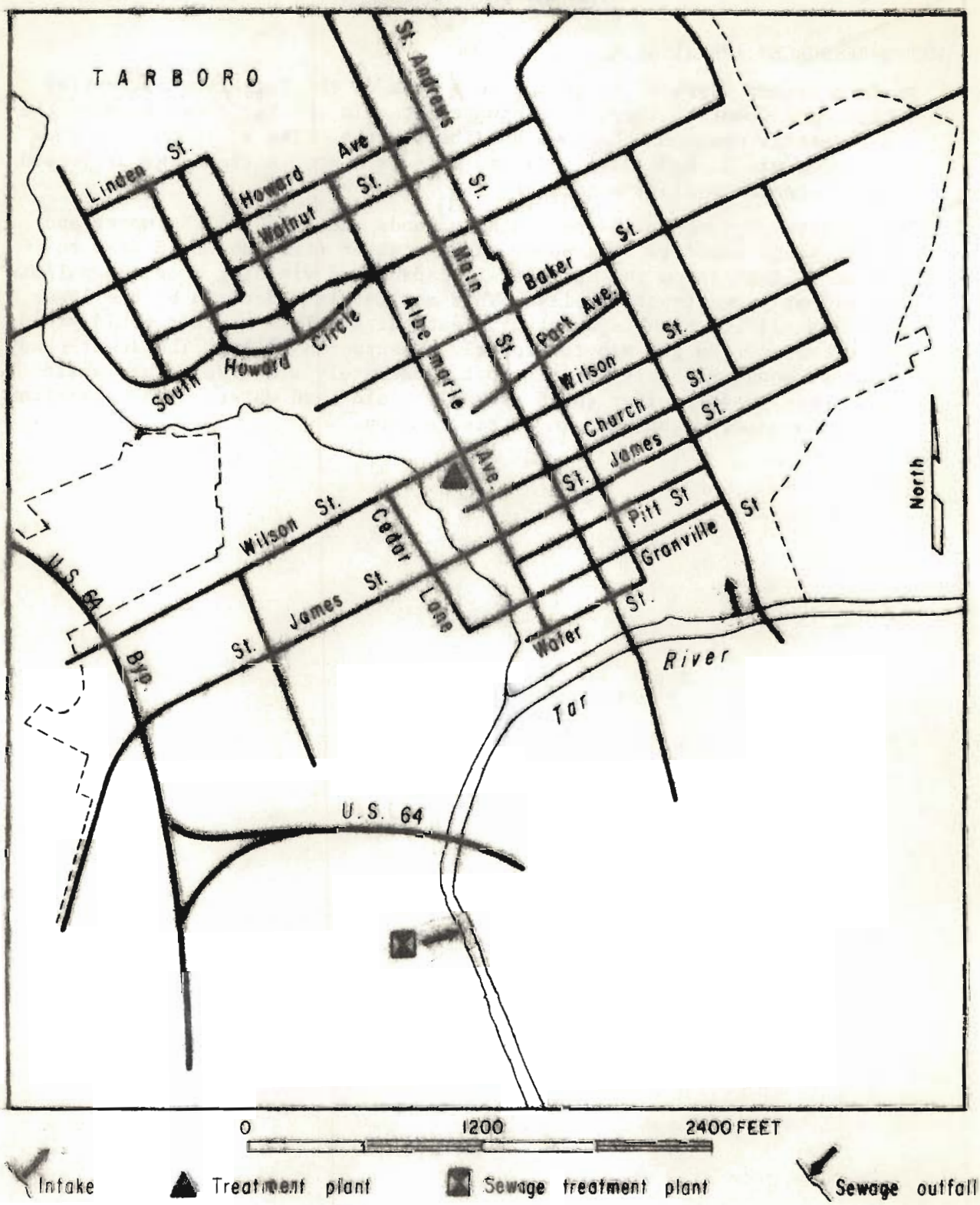
TARBORO, EDGECOMBE COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Tarboro is on the west bank of the Tar River in central Edgecombe County. There is adequate water in the Tar River to meet the foreseeable needs of the town and its suburbs. The minimum daily flow recorded was 23 Mgal/d in 1934 and this is almost 4 times the projected water treatment plant capacity.

Ground water: Tarboro is underlain by sands and clays of the upper and lower sandy aquifer. The upper sandy aquifer (from about 15 feet to about 65 feet below the surface) is capable of yielding about 25 gal/min to properly constructed wells. This aquifer is underlain by the lower sandy aquifer, which is about 250 feet thick. This aquifer could yield in excess of 100 gal/min to properly constructed wells. The lower sandy aquifer would probably yield a soft, moderately alkaline water, while the upper sandy aquifer would probably yield hard water. The water from either aquifer might contain excessive iron.

TOWN OF TARBORO



TARBORO, EDGECOMBE COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Tar River Finished	Tar River Finished	Tar River Raw	
Date of collection.....	5-23-66	9-26-74	10-1-74	
Silica (SiO_2).....	11	----------	15	
Iron (Fe).....	.04	.010	.510	
Manganese (Mn).....	.02	.024	.016	
Calcium (Ca).....	5.1	----------	7.5	
Magnesium (Mg).....	1.7	----------	2.1	
Sodium (Na).....	26	----------	9.0	
Potassium (K).....	1.7	----------	2.4	
Bicarbonate (HCO_3).....	41	----------	31	
Carbonate (CO_3).....	0	----------	0	
Alkalinity as $CaCO_3$.....	34	----------	25	
Sulfate (SO_4).....	16	----------	8.9	
Chloride (Cl).....	20	17	10	
Fluoride (F).....	1.2	----------	.3	
Nitrate (NO_3).....	.6	----------	----------	
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	
Dissolved Solids.....	106	----------	71	
Hardness as $CaCO_3$:				
Total.....	26	----------	27	
Noncarbonate.....	0	----------	2	
Specific conductance (micromhos at 25°C)....	179	180	95	
pH (units).....	7.2	----------	6.9	
Temperature (°C).....	----------	----------	17.5	
Arsenic (As).....	----------	.000	.001	
Barium (Ba).....	----------	.000	----------	
Boron (B).....	----------	.000	----------	
Cadmium (Cd).....	----------	.001	.000	
Chromium (Cr).....	----------	.000	.000	
Cobalt (Co).....	----------	.000	.000	
Copper (Cu).....	----------	.007	.002	
Lead (Pb).....	----------	.002	.003	
Lithium (Li).....	----------	.000	----------	
Mercury (Hg).....	----------	.000	.003	
Strontium (Sr).....	----------	.070	----------	
Zinc (Zn).....	----------	.008	.000	

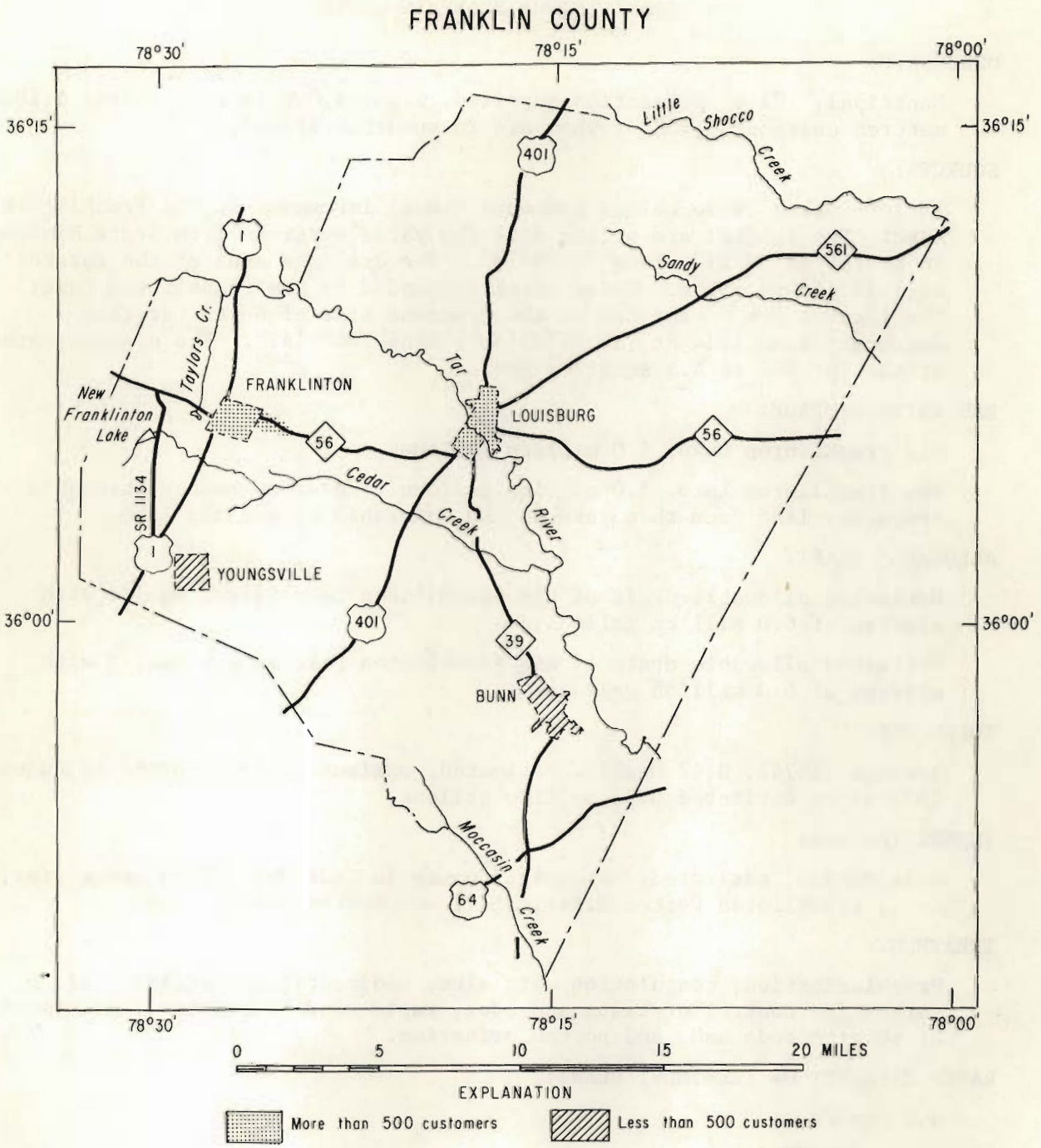
FRANKLIN COUNTY

WATER-RESOURCES APPRAISAL

Franklin County is in the northern part of the Piedmont Province in the north-central part of North Carolina. The topography is rolling. The county is drained by the Tar River and its tributaries, except for a small area in the southern part of the county which lies within the Neuse River drainage area. With the exception of a few minor impoundments, the streams are unregulated. The average flow of the streams is 0.65 (Mgal/d)/mi^2. Minimum flows of unregulated streams range from 0.0065 to 1.1 (Mgal/d)/mi^2 and average 0.047 (Mgal/d)/mi^2. The 7-day, 2-year low-flow of streams averages 0.13 (Mgal/d)/mi^2. There are only two public water supplies having 500 or more customers. These are Louisburg and Franklinton. Both of these are surface-water supplies. Between them, they serve 7,100 of the county's population (1970) of 26,820. Most of the remaining populace are served either by small public supplies or by individual ground-water supplies.

The county is underlain by metamorphic rocks. These rocks yield water to wells largely through cracks and weathered zones in the subsurface. Well yields range from virtually zero to 100 gal/min, averaging 16 gal/min. The higher-yielding wells are usually located in stream valleys or other low areas. The ground water is soft to moderately hard and may contain objectionable amounts of iron.

The available ground water is adequate for domestic supplies and small industrial and public supplies. The estimated amount of ground water available for development is 0.53 (Mgal/d)/mi^2.


FRANKLIN COUNTY
78°30'
78°15'
78°00'
36°15'
36°00'
Little Shocco Creek
Sandy Creek
Taylors Cr.
New Franklinton Lake
FRANKLINTON
Tar River
LOUISBURG
Cedar Creek
SR 1134
YOUNGSVILLE
BUNN
Moccasin Creek
401
561
56
39
64
0 5 10 15 20 MILES
EXPLANATION
More than 500 customers
Less than 500 customers

FRANKLINTON, FRANKLIN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 4,000 in 1974 (about 1,100 metered customers, 200 of whom are in suburban areas).

SOURCES:

Taylors Creek (also called Kearneys Creek) impounded in Old Franklinton Lake: The intakes are at the dam, 200 yards upstream from State Highway 56 at lat 36°06'15", long 78°28'18". The drainage area at the intakes is 1.12 square miles. Cedar Creek impounded in New Franklinton Lake: The intakes are at the dam on the upstream side of North Carolina Secondary Road 1134 at lat 36°05'48", long 78°29'47". The drainage area at the intakes is 4.8 square miles.

RAW-WATER STORAGE:

Old Franklinton Lake, 6.0 million gallons.

New Franklinton Lake, 6.0 million gallons. Water is pumped through a temporary line from this lake to the watershed of the old lake.

ALLOWABLE DRAFT:

Estimated allowable draft of Old Franklinton Lake is 0.2 Mgal/d with storage of 6.0 million gallons.

Estimated allowable draft of New Franklinton Lake is 0.6 Mgal/d with storage of 6.0 million gallons.

TOTAL USE:

Average (1974), 0.42 Mgal/d, estimated; maximum daily occurred in August 1973 at an estimated 0.52 million gallons.

INDUSTRIAL USE:

0.14 Mgal/d, estimated. Principal users include Burlington Industries, Inc., Franklinton Cotton Mills, Inc., and Durham Hosiery, Inc.

TREATMENT:

Prechlorination, coagulation with alum, sedimentation, addition of carbon for control of taste and odor, rapid sand filtration, adjustment of pH with soda ash, and postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

1.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 1.0 Mgal/d; finished water, 1.0 Mgal/d

FINISHED-WATER STORAGE:

One clear well, 150,000 gallons; two elevated tanks, 100,000 and 150,000 gallons.

FRANKLINTON, FRANKLIN COUNTY

FUTURE PLANS:

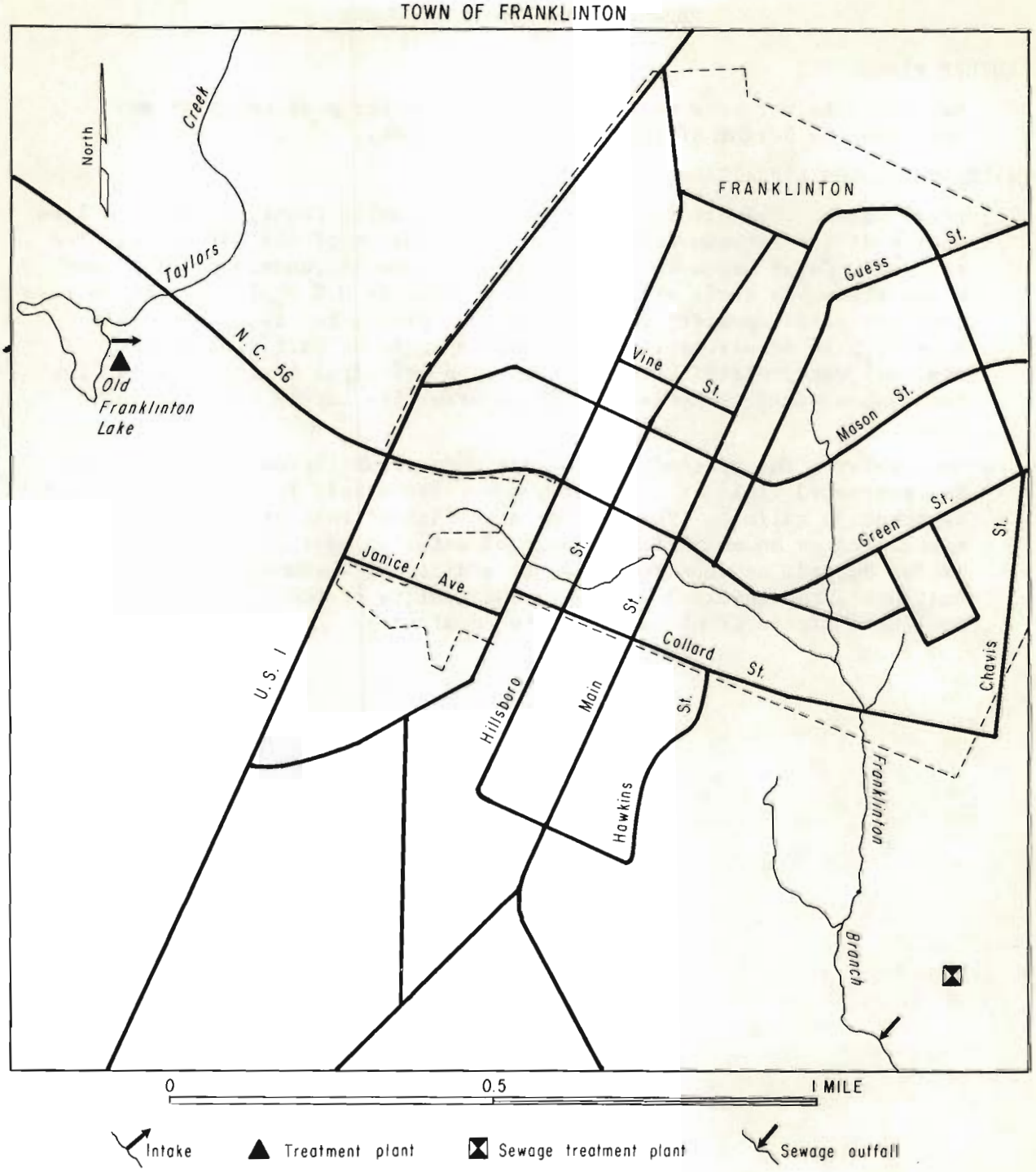
May tie into a future regional water system for peak needs or may increase the height of the dam on Cedar Creek.

WATER-RESOURCES APPRAISAL:

Surface water: Franklinton is in western Franklin County. The town lies on the divide between several small tributaries of the Tar River. Two of these, Cedar Creek and Taylors Creek, have impoundments. The combined allowable draft at these impoundments is 0.8 Mgal/d. This is less than the rated capacity of the treatment plant, but is greater than present peak requirements. The town hopes to be part of a projected regional water-distribution system. The principal source of water for the system would be Louisburg, which draws its supply from the Tar River.

Ground water: The predominant bedrock under Franklinton is mica gneiss. The estimated yield of a properly-constructed well in that type of rock is about 30 gal/min. This yield is sufficient that ground water can be considered as an auxilliary source of water to meet possible future excess demand, as an alternative to additional impoundments. In most instances, the chemical and bacterial quality of the ground water is such that little or no treatment is required.

TOWN OF FRANKLINTON



FRANKLINTON, FRANKLIN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Taylors Cr. Raw	Taylors Cr. Finished	Taylors Cr. Raw	Taylors Cr. Finished
Date of collection.....	5-20-66	5-20-66	9-13-74	9-13-74
Silica (SiO2).....	13	15	----------	----------
Iron (Fe).....	.01	.02	.290	.000
Manganese (Mn).....	.00	.01	.078	.011
Calcium (Ca).....	3.6	10	----------	----------
Magnesium (Mg).....	.9	.9	----------	----------
Sodium (Na).....	3.7	4.5	----------	----------
Potassium (K).....	1.6	1.8	----------	----------
Bicarbonate (HCO3).....	20	21	----------	----------
Carbonate (CO3).....	0	0	----------	----------
Alkalinity as CaCO3.....	16	17	----------	----------
Sulfate (SO4).....	2.6	13	----------	----------
Chloride (Cl).....	4.0	7.1	3.6	8.1
Fluoride (F).....	.1	.1	----------	----------
Nitrate (NO3).....	.5	.3	----------	----------
Nitrite + Nitrate as Nitrogen (NO2 + NO3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	52	67	----------	----------
Hardness as CaCO3:				
Total.....	14	29	----------	----------
Noncarbonate.....	0	12	----------	----------
Specific conductance (micromhos at 25°C)....	53	90	58	128
pH (units).....	6.4	6.9	----------	----------
Temperature (°C).....	20	----------	----------	----------
Arsenic (As).....	----------	----------	.000	.000
Barium (Ba).....	----------	----------	.100	.100
Boron (B).....	----------	----------	.030	.020
Cadmium (Cd).....	----------	----------	.000	.000
Chromium (Cr).....	----------	----------	.001	.001
Cobalt (Co).....	----------	----------	.002	.002
Copper (Cu).....	----------	----------	.042	.004
Lead (Pb).....	----------	----------	.002	.001
Lithium (Li).....	----------	----------	.000	.002
Mercury (Hg).....	----------	----------	.0001	.0000
Strontium (Sr).....	----------	----------	.040	.030
Zinc (Zn).....	----------	----------	.006	.006

LOUISBURG, FRANKLIN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 3,100 in 1974 (1,200 metered customers, about 25 of whom are in suburban districts).

SOURCE:

Tar River. The intakes are located on the east side of the river about 600 feet northwest of the treatment plant at lat 36°06'08", long 78°18'07". The drainage area at the intakes is about 428 square miles.

RAW-WATER STORAGE:

None.

ALLOWABLE DRAFT:

Estimated allowable draft is 7.0 Mgal/d.

TOTAL USE:

Average (July 1973 - June 1974), 0.50 Mgal/d, metered; maximum daily, 0.89 Mgal/d.

INDUSTRIAL USE:

0.27 Mgal/d, metered. Principal users include Dean Farms, Inc., Gay Products, Inc., Louisburg Sportswear, Inc., Rockwell International, Inc., and Rischel Manufacturing Co.

TREATMENT:

Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, adjustment of pH with lime, postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

1.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 1.0 Mgal/d; finished water, 1.0 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 350,000 gallons; three elevated tanks, 300,000, 100,000, and 100,000; one standpipe, 220,000 gallons.

FUTURE PLANS:

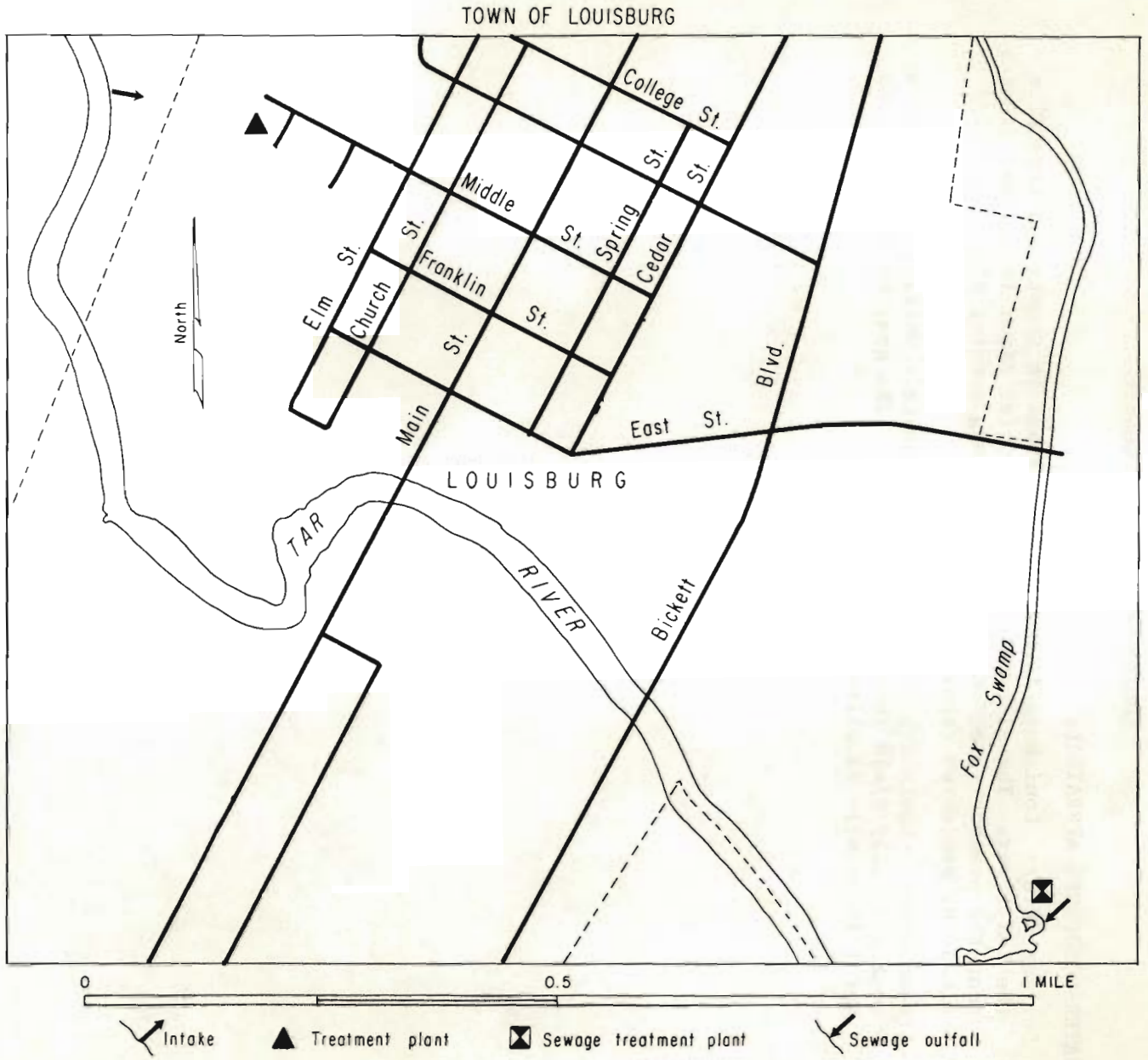
Plan to increase plant capacity to 2 Mgal/d. This would involve a low dam on the Tar River at the plant, additional sedimentation tanks, more pumps. and a high-rate filter. The additional capacity would serve a regional system involving Franklinton, Youngsville, and a new industrial complex.

LOUISBURG, FRANKLIN COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Louisburg lies in central Franklin County and straddles the Tar River. The allowable draft of the Tar River is 7 times greater than the present rated capacity of Louisburg's water plant and 3-1/2 times the projected capacity.

Ground water: Louisburg is underlain by granite. Wells in this type of rock generally yield less than 20 gal/min. The quality of the ground water is usually excellent.


TOWN OF LOUISBURG
College St.
St.
St.
Middle
St.
Spring
Cedar
Blvd.
Elm St.
St.
Church
Franklin
St.
St.
Main
St.
East St.
North
LOUISBURG
TAR
RIVER
Bickett
Fox Swamp
0
0.5
1 MILE
Intake
Treatment plant
Sewage treatment plant
Sewage outfall

LOUISBURG, FRANKLIN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Tar River Raw	Tar River Finished	Tar River Raw	Tar River Finished
Date of collection.....	5-20-66	5-20-66	9-13-74	9-13-74
Silica (SiO_2).....	18	16	----------	----------
Iron (Fe).....	.19	.00	.490	.010
Manganese (Mn).....	.01	.01	.044	.011
Calcium (Ca).....	6.6	12	----------	----------
Magnesium (Mg).....	2.4	2.6	----------	----------
Sodium (Na).....	6.6	6.7	----------	----------
Potassium (K).....	1.3	1.4	----------	----------
Bicarbonate (HCO_3).....	39	37	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	32	30	----------	----------
Sulfate (SO_4).....	3.4	17	----------	----------
Chloride (Cl).....	4.5	6.7	4.5	12
Fluoride (F).....	.1	.1	----------	----------
Nitrate (NO_3).....	.2	.3	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	62	81	----------	----------
Hardness as $CaCO_3$:				
Total.....	27	42	----------	----------
Noncarbonate.....	0	11	----------	----------
Specific conductance (micromhos at 25°C)....	80	122	78	122
pH (units).....	6.7	7.2	----------	----------
Temperature (°C).....	21	----------	----------	----------
Arsenic (As).....	----------	----------	.000	.000
Barium (Ba).....	----------	----------	.300	.100
Boron (B).....	----------	----------	.040	.020
Cadmium (Cd).....	----------	----------	.000	.000
Chromium (Cr).....	----------	----------	.001	.000
Cobalt (Co).....	----------	----------	.002	.002
Copper (Cu).....	----------	----------	.084	.069
Lead (Pb).....	----------	----------	.002	.000
Lithium (Li).....	----------	----------	.002	.001
Mercury (Hg).....	----------	----------	.0001	.0001
Strontium (Sr).....	----------	----------	.050	.070
Zinc (Zn).....	----------	----------	.010	.040

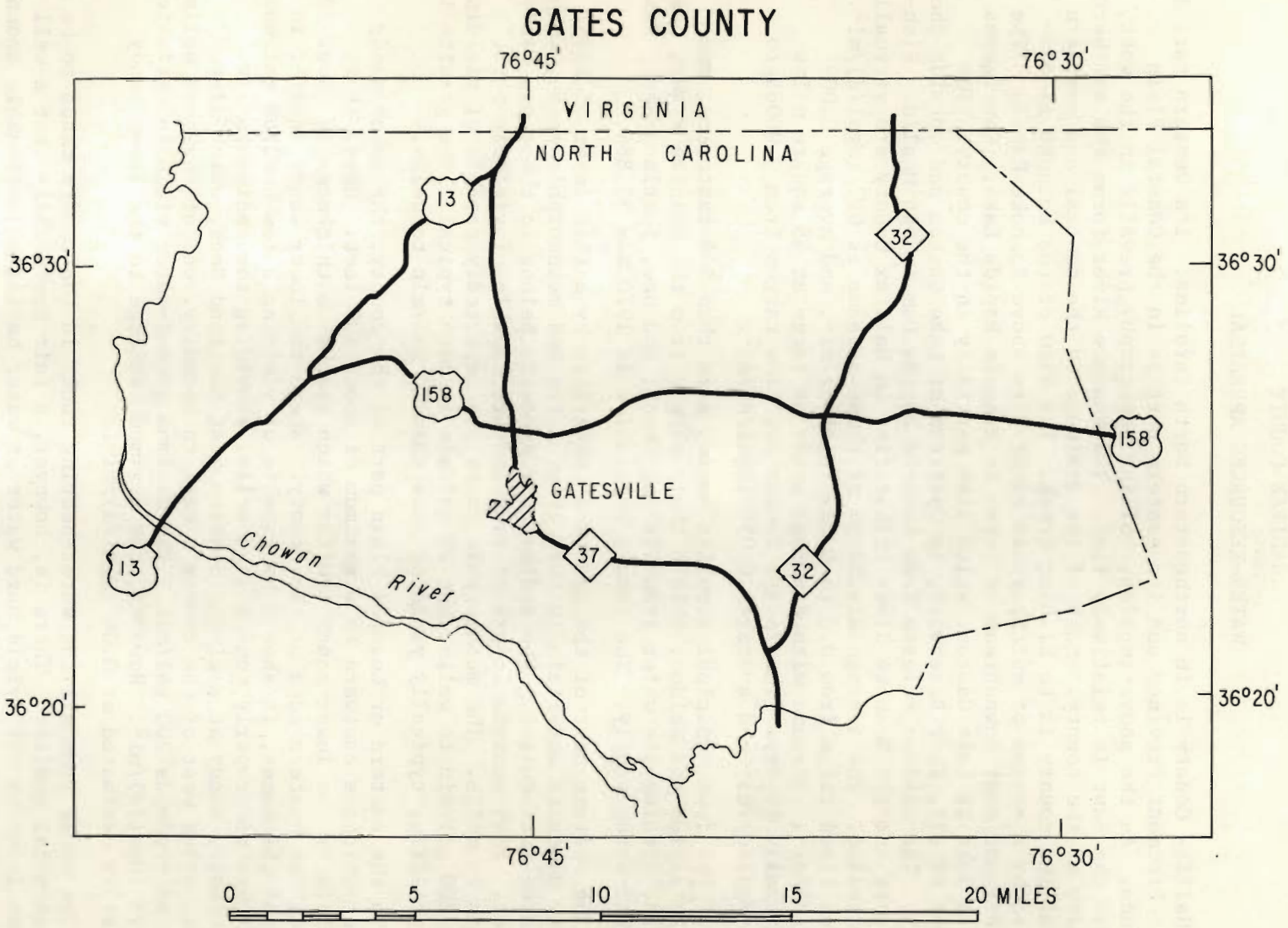
GATES COUNTY

WATER-RESOURCES APPRAISAL

Gates County is located in the northeastern part of the North Carolina Coastal Plain. The topography of the county is low and flat. The eastern and western quarters of the county consist of swampland. Drainage is to the Chowan River on the west and to Dismal Swamp on the east. The Chowan River is estuarine throughout its length. At a point just north of where U.S. Route 13 crosses the Chowan, the water is always fresh and low flows are many millions of gallons per day. Most streams in the county go dry in drought. The average discharge of streams is 0.71 $(Mgal/d)/mi^2$.

There are no public water supplies in the county having 500 or more customers. All known public and individual supplies are from ground water. The county population in 1970 was 8,524.

The county is underlain by an estimated 800 to 2,300 feet of alternating sands, clays, and shells. The upper sandy aquifer averages about 200 feet thick in the county. The lower sandy aquifer comprises the remainder of the deposits. The depth to salt water varies from 400 to more than 600 feet. Little is known about the water-bearing character of these aquifers; but it is probable that, in many locations, well yields of over 1,000 gal/min could be obtained from properly constructed wells. The maximum yield of ground water in the county is estimated at 1.0 $(Mgal/d)/mi^2$. However, the maximum obtainable recharge to the lower sandy aquifer is estimated at 0.06 $(Mgal/d)/mi^2$. The water from shallow wells tends to be soft, with a low pH. Wells of a hundred feet or so of depth tend to yield moderately hard water which may contain excessive fluoride. Water from very deep wells is normally very soft, with a very high pH, high bicarbonate content, and excessive concentrations of fluoride and dissolved-solids. The water from wells of all depths tends to have an excessive iron content.


GATES COUNTY
76°45'
76°30'
VIRGINIA
NORTH CAROLINA
13
32
36°30'
158
158
GATESVILLE
37
13
32
Chowan River
36°20'
76°45'
76°30'
0 5 10 15 20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
Less than 500 customers

HALIFAX COUNTY

WATER-RESOURCES APPRAISAL

Halifax County is in northeastern North Carolina. Its western part is in the Piedmont Province and its eastern part is in the Coastal Plain Province. As the above implies, rolling topography prevails in the west, whereas the east is relatively flat. The Roanoke River forms the northern boundary of the county. Much of the drainage in the central and southern part of the county is to Fishing Creek. The flow of the Roanoke is controlled by a series of multipurpose reservoirs above Roanoke Rapids. The smallest and most downstream of these is Roanoke Rapids Lake. Contiguous to this lake is Lake Gaston, which lies partially in the county. The largest of all, Kerr Reservoir, is upstream of Lake Gaston and outside the county. The minimum release from Roanoke Rapids Dam is 646 Mgal/d. Fishing Creek and the Roanoke River tributaries in Halifax County are virtually uncontrolled. The average discharge of these streams is 0.7 $(Mgal/d)/mi^2$. Minimum flows range from 0.0 to 0.027 $(Mgal/d)/mi^2$, and average 0.009 $(Mgal/d)/mi^2$. Streams with drainage areas as large as 45 square miles occasionally go dry. The 7-day, 2-year low flow ranges from 0.00065 to 0.10 $(Mgal/d)/mi^2$ and averages 0.050 $(Mgal/d)/mi^2$.

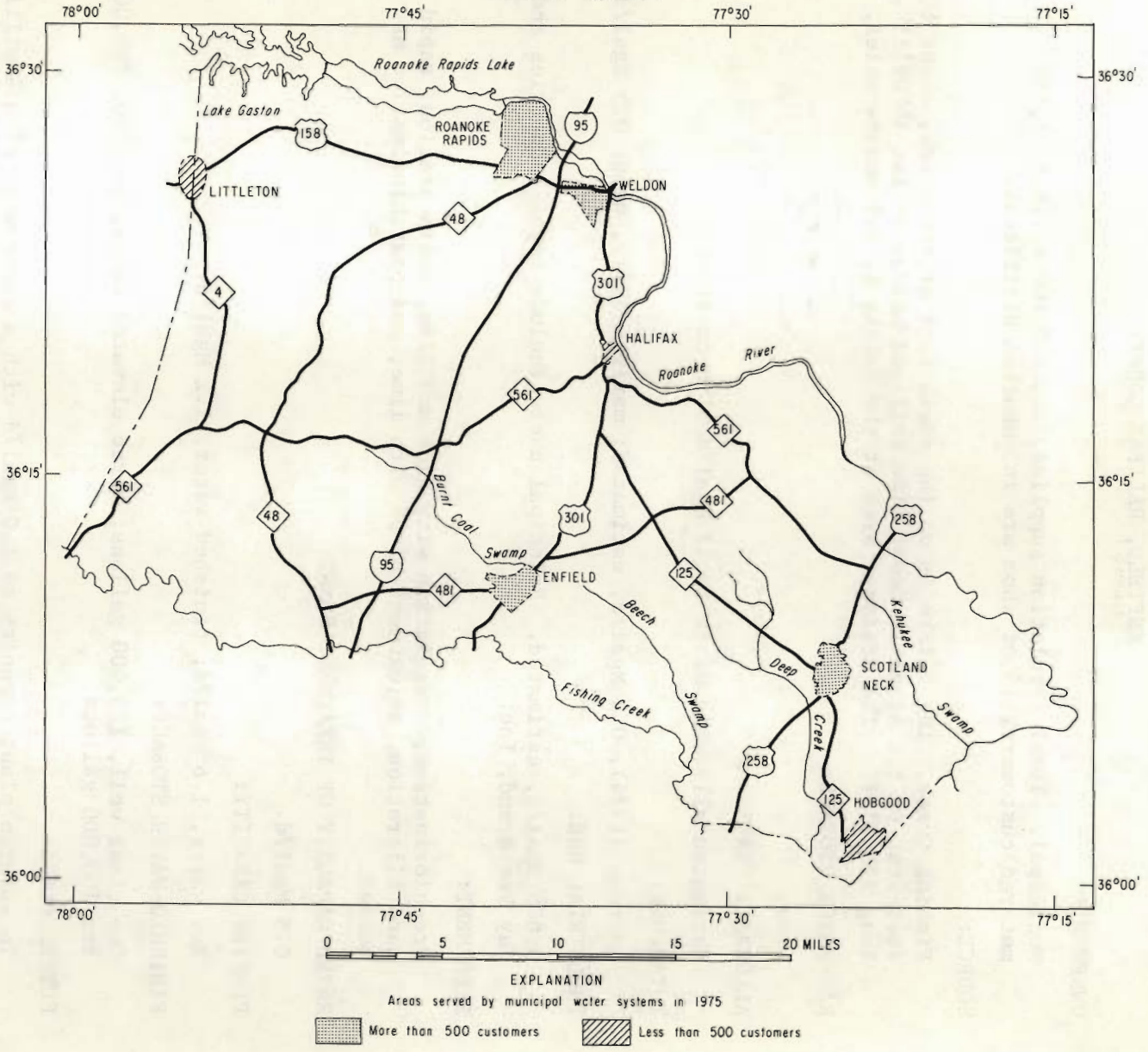
Of the four municipal supplies having more than 500 customers, two, Roanoke Rapids and Weldon, obtain their supply from the Roanoke River; one, Enfield, obtains its water from Fishing Creek; and one, Scotland Neck, has a ground-water supply. The county population in 1970 was 53,884.

The western part of the county is underlain by a thin layer of sedimentary deposits underlain in turn by granites and metamorphic rocks, such as slates and schists. The sedimentary deposits belong to the upper sandy aquifer. They contain layers of sand and are capable of yielding 5 to 15 gal/min to wells. The metamorphic rocks are reportedly capable of yielding up to 200 gal/min to wells, but 25 gal/min is more typical. The granite is less prolific, typically yielding less than 10 gal/min to wells.

In the eastern or Coastal Plain part of the county, the upper sandy aquifer thickens eastward to a maximum of about 100 feet. Here, it is underlain by the lower sandy aquifer which reaches a thickness of about 300 feet at the eastern edge of the county. Where the lower sandy aquifer is of that thickness, it should be capable of yielding a few hundred gallons per minute to properly constructed wells, providing the sediments are sufficiently sandy at a given location. At Scotland Neck, which lies several miles west of the county's eastern boundary, one of the town wells reportedly yields 200 gal/min. The maximum ground-water yield is estimated at 0.73 $(Mgal/d)/mi^2$. However, the maximum recharge to the lower sandy aquifer is estimated at 0.04 $(Mgal/d)/mi^2$.

The water from all the water-bearing rocks in the county tends to be of good chemical quality. There is, however, a fair probability that a well at a given location will yield hard water or water having objectionable amounts of iron. This is especially true of the lower sandy aquifer. In addition, the lower sandy aquifer may contain salty water at the greater depths near the eastern boundary of the county.

HALIFAX COUNTY



ENFIELD, HALIFAX COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 3,100 in 1974 (1,450 metered customers, 15 of whom are in suburban districts).

SOURCE:

Fishing Creek. The intake is on the north bank of the creek, about 600 feet west of the Atlantic Coast Line railroad bridge at lat 36°09'11", long 77°41'59". The drainage area at the intake is 5.9 square miles.

RAW-WATER STORAGE:

None.

524± ? 2/27/95

ALLOWABLE DRAFT:

Estimated allowable draft is 17 Mgal/d with no storage.

TOTAL USE:

Average (1974), 0.4 Mgal/d, estimated; maximum daily, about 0.5 Mgal/d.

INDUSTRIAL USE:

0.075 Mgal/d, estimated. Principal users include Royal Industries and Jay Vee Brand, Inc.

TREATMENT:

Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, adjustment of pH with lime, and postchlorination as needed.

RATED CAPACITY OF TREATMENT PLANT:

0.5 Mgal/d.

PUMPING CAPACITY:

Raw water, 1.6 Mgal/d; finished water, 1.2 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 125,000 gallons; three elevated tanks, 200,000, 200,000, and 100,000 gallons.

FUTURE PLANS:

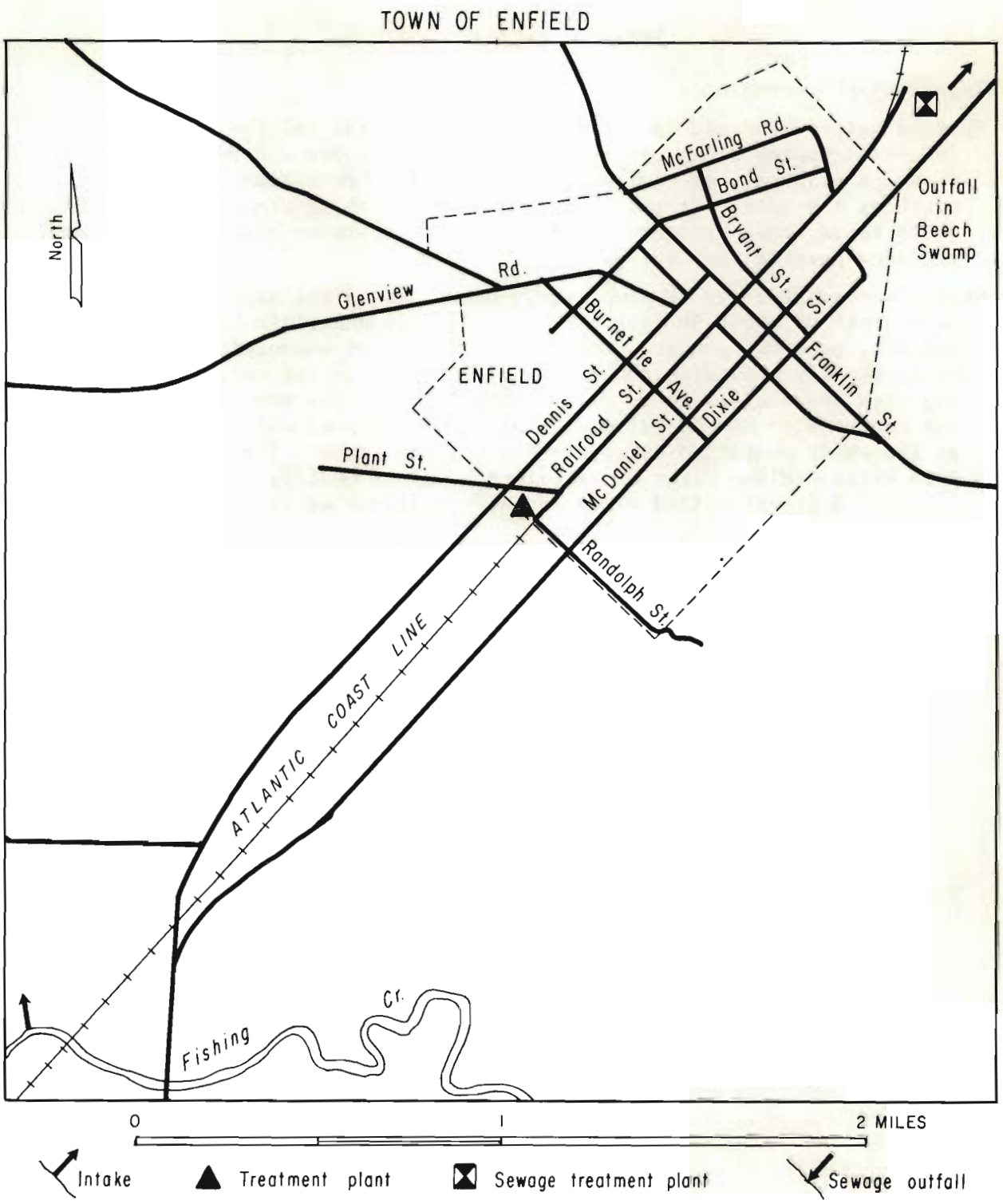
To enlarge plant capacity to 1.0 Mgal/d with a clear well of 0.4 million gallons capacity. A water main will be extended 500 feet to a new housing development. The raw-water pumping capacity will be increased by 1.4 Mgal/d and that of finished water will be increased by 1.0 Mgal/d.

ENFIELD, HALIFAX COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Enfield is located in south-central Halifax County on a low, flat-topped ridge between Fishing Creek proper and Burnt Coat Swamp, a tributary of Fishing Creek. Fishing Creek lies two miles south of the town. At the town's intake on Fishing Creek the allowable draft is 34 times greater than the present treatment plant capacity and 17 times greater than the planned capacity.

Ground water: Enfield is immediately underlain by the upper sandy aquifer to a depth of about 50 feet. This aquifer is underlain by crystalline bedrock, probably schist. The town formerly had a municipal ground-water supply, utilizing numerous shallow wells in the unconsolidated deposits and a single deep well in the schist. The deep well's yield was reported to be 200 gal/min. This well was used only in emergencies as its water contained excessive hardness and iron. The shallow municipal wells yielded water of excellent chemical quality, but the combined yield of 3 gravel-walled wells and eleven driven wells was only 100 gal/min.


TOWN OF ENFIELD
North
McFarling Rd.
Bond St.
Bryant St.
Outfall in Beech Swamp
Glenview Rd.
ENFIELD
Burnette St.
Dennis St.
Railroad St.
Ave.
Dixie St.
Franklin St.
Plant St.
Mc Daniel St.
Randolph St.
ATLANTIC COAST LINE
Fishing Cr.
0
1
2 MILES
Intake
Treatment plant
Sewage treatment plant
Sewage outfall

ENFIELD, HALIFAX COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Fishing Cr. Raw	Fishing Cr. Finished	Fishing Cr. Raw	Fishing Cr. Finished
Date of collection.....	5-15-64	5-15-64	8-23-74	8-23-74
Silica (SiO_2).....	17	17	----------	----------
Iron (Fe).....	.12	.00	.450	.010
Manganese (Mn).....	.00	.00	.017	.017
Calcium (Ca).....	6.4	15	----------	----------
Magnesium (Mg).....	2.0	2.2	----------	----------
Sodium (Na).....	5.4	5.4	----------	----------
Potassium (K).....	1.3	1.3	----------	----------
Bicarbonate (HCO_3).....	37	39	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	30	32	----------	----------
Sulfate (SO_4).....	1.6	15	----------	----------
Chloride (Cl).....	4.0	7.8	2.7	6.4
Fluoride (F).....	.1	.0	----------	----------
Nitrate (NO_3).....	.4	.2	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	58	87	----------	----------
Hardness as $CaCO_3$:				
Total.....	25	46	----------	----------
Noncarbonate.....	0	14	----------	----------
Specific conductance (micromhos at 25°C)....	74	125	62	106
Arsenic (As).....	----------	----------	.001	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.070	.050
Cadmium (Cd).....	----------	----------	.002	.001
Chromium (Cr).....	----------	----------	.001	.000
Cobalt (Co).....	----------	----------	.007	.013
Copper (Cu).....	----------	----------	.007	.025
Lead (Pb).....	----------	----------	.009	.004
Lithium (Li).....	----------	----------	.002	.002
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	.080	.090
Zinc (Zn).....	----------	----------	.004	.010
pH (units).....	7.0	7.6	----------	----------
Temperature (°C).....	----------	----------	----------	----------

ROANOKE RAPIDS, HALIFAX COUNTY

OWNERSHIP:

Roanoke Rapids Sanitary District. Total population supplied about 16,000 in 1974 (5,320 metered customers, about 200 of whom are in suburban areas).

SOURCE:

The intakes are on the south side of Roanoke Rapids Lake near the dam. They are located at lat 36°28'45", long 77°40'28". The drainage area at the dam is 8,400 square miles.

RAW-WATER STORAGE:

Roanoke Rapids Lake, 25 billion gallons. Storage is controlled by Virginia Electric Power Co.

ALLOWABLE DRAFT:

Not determined. There are no contractual quantity restrictions as to the amount of water that can be withdrawn from Roanoke Rapids Lake.

TOTAL USE:

Average (1974), 5.5 Mgal/d, metered; maximum daily (7-16-74), 8.3 million gallons.

INDUSTRIAL USE:

4.5 Mgal/d metered. Principal users include J. P. Stevens and Co., Inc., Horner-Waldorf Paper Co., Whittaker Knitting Mills, Inc., and Federal Board and Paper Co.

TREATMENT:

Prechlorination, coagulation with alum, sedimentation, addition of carbon for control of taste and odor, rapid dual media filtration, adjustment of pH with caustic soda, postchlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT.

12.0 Mgal/d.

PUMP CAPACITY:

Raw water, 12 Mgal/d; Finished water, 10 Mgal/d.

FINISHED-WATER STORAGE:

Two clear wells, total capacity 3,250,000 gallons; two elevated tanks, each of 500,000 gallons.

FUTURE PLANS:

None.

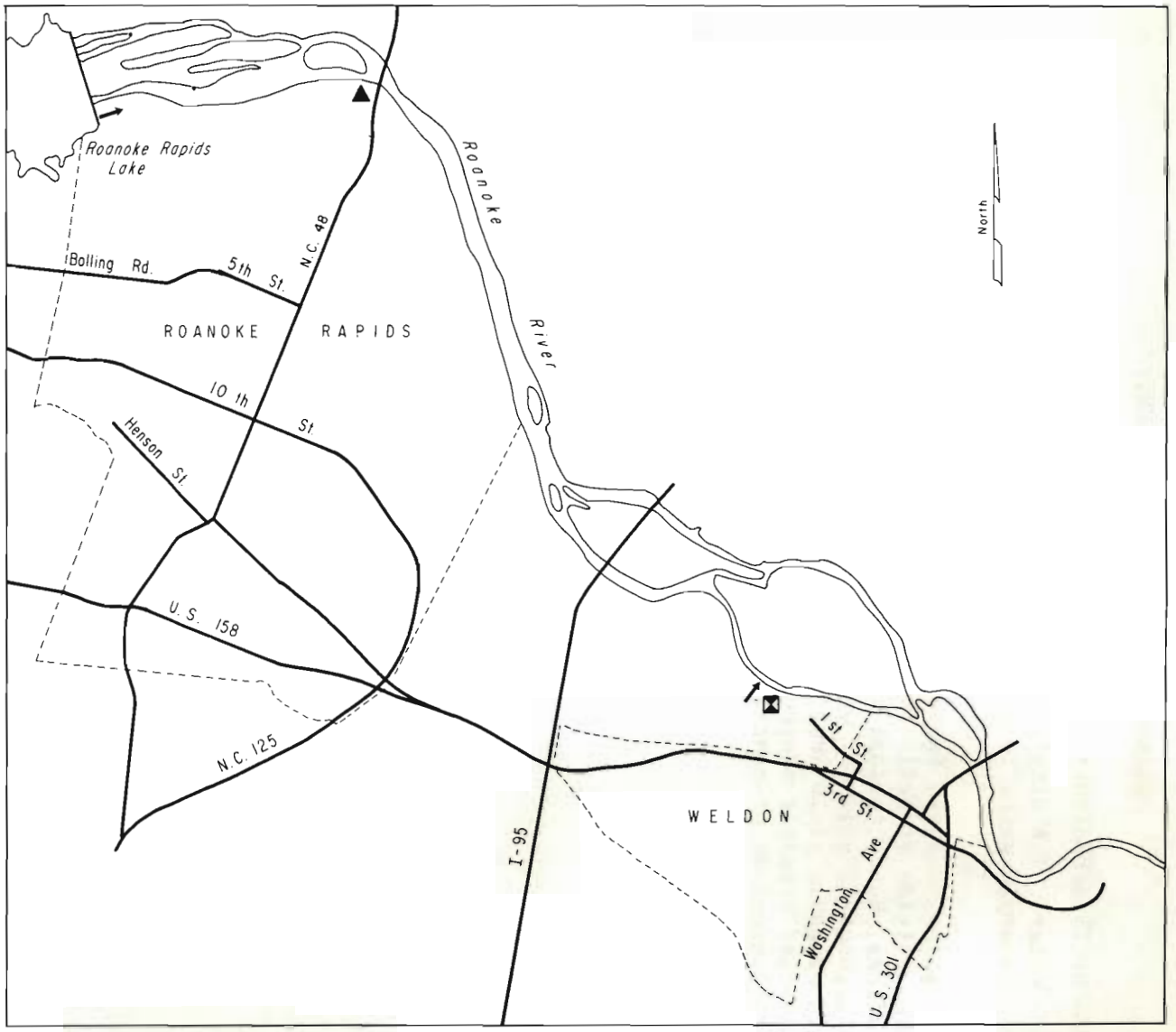
ROANOKE RAPIDS, HALIFAX COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: The city's intake is located in Roanoke Rapids Lake. There is ample water in the lake to meet Roanoke Rapids foreseeable needs.

Ground water: Roanoke Rapids is underlain by metamorphic and granitic rocks. Yields of wells from these rocks vary greatly at different locations, but a typical well in the metamorphic rocks would probably yield about 25 gal/min, while a typical well in the granitic rocks would probably yield less than half that. The alluvium along the river is another possible source of ground water. The water from any of these sources might contain excessive iron or hardness.

CITY OF ROANOKE RAPIDS



ROANOKE RAPIDS, HALIFAX COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished).....	Roanoke Rapids Lake Raw	Roanoke Rapids Lake Finished	Roanoke Rapids Lake Raw	Roanoke Rapids Lake Finished
Date of collection.....	4-18-62	4-18-62	8-22-74	8-22-74
Silica (SiO_2).....	11	11	----------	----------
Iron (Fe).....	.00	.00	.030	.020
Manganese (Mn).....	.00	.00	.017	.000
Calcium (Ca).....	6.3	5.9	----------	----------
Magnesium (Mg).....	2.3	2.5	----------	----------
Sodium (Na).....	4.5	19	----------	----------
Potassium (K).....	1.5	1.6	----------	----------
Bicarbonate (HCO_3).....	29	44	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	24	36	----------	----------
Sulfate (SO_4).....	6.2	19	----------	----------
Chloride (Cl).....	4.7	6.2	4.3	8.4
Fluoride (F).....	.2	1.0	----------	----------
Nitrate (NO_3).....	.5	.8	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	54	89	----------	----------
Hardness as $CaCO_3$:				
Total.....	26	26	----------	----------
Noncarbonate.....	2	0	----------	----------
Specific conductance (micromhos at 25°C)....	74	140	88	160
Arsenic (As).....	----------	----------	.001	.001
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.020	.050
Cadmium (Cd).....	----------	----------	.001	.000
Chromium (Cr).....	----------	----------	.001	.001
Cobalt (Co).....	----------	----------	.013	.013
Copper (Cu).....	----------	----------	.008	.004
Lead (Pb).....	----------	----------	.003	.003
Lithium (Li).....	----------	----------	.002	.000
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	.070	.080
Zinc (Zn).....	----------	----------	.004	.004
pH (units).....	7.0	7.3	----------	----------
Temperature (°C).....	----------	----------	----------	----------

SCOTLAND NECK, HALIFAX COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 3,000 in 1974 (1,039 metered customers, 36 of which are in suburban districts).

SOURCE:

Eleven wells (Nos. 1-8 and D2, D3).

Well No. 1, Ha-133, located at lat 36°07'30", long 77°24'46". Driller: Layne-Atlantic Company. Date drilled: 1937. Total depth: 96 ft. Diam: 8 in. Cased to: 64 ft. Type of finish: screened (gravel-packed). Screened intervals: 64-74 ft, 86-96 ft. Topography: flat. Aquifers: upper and lower sandy. Static water level: 35 ft. Pump capacity: _____. Pump setting: 79 ft. Type pump: turbine.

Well No. 2, Ha-154, located at lat 36°07'36", long 77°24'47". Driller: Layne-Atlantic Company. Date drilled: 1959. Total depth: 100 ft. Diam: 6 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Aquifers: probably upper and lower sandy. Static water level: _____. Pump capacity: _____. Pump setting: 54 ft. Type pump: turbine.

Well No. 3, Ha-155, located at lat 36°07'37", long 77°24'41". Driller: Layne-Atlantic Company. Date drilled: 1969. Total depth: 125 ft. Diam: 6 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifers: probably upper and lower sandy. Static water level: _____. Pump capacity: _____. Pump setting: about 30 ft. Type pump: submersible.

Well No. 4a, Ha-156, located at lat 36°07'39", long 77°24'45". Driller: _____. Date drilled: June 1974. Total depth: 70 ft. Diam: 8 in. Cased to: 40 ft. Type of finish: screened (gravel-packed). Screened intervals: 40-50 ft, 60-70 ft. Topography: flat. Aquifer: upper sandy. Static water level _____. Pump capacity: _____. Pump setting: about 66 ft. Type pump: submersible.

Well No. 4b, Ha-157, located at lat 36°07'39", long 77°24'45". Driller: _____. Date drilled: June 1974. Total depth: 35 ft. Diam: 6 in. Cased to: 26 ft. Type of finish: screened (gravel-packed). Screened intervals: 26-32 ft. Topography: flat. Aquifer: upper sandy. Static water level: _____. Pump capacity: _____. Pump setting: about 31 ft. Type pump: submersible.

Well No. 5 (auxiliary well), Ha-158, located at lat 36°07'44", long 77°24'48". Driller: _____. Date drilled: 1959. Total depth: 54 ft. Dima: 6 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: upper sandy. Static water level: _____. Pump capacity: _____. Pump setting: about 30 ft. Type pump: turbine.

SCOTLAND NECK, HALIFAX COUNTY

Well No. 6, Ha-159, located at lat 36°07'48", long 77°24'42". Driller: Layne-Atlantic Company. Date drilled: 1958. Total depth: 60 ft. Diam: 6 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: sand. Static water level: _____. Pump capacity: _____. Pump setting: 54 ft. Type pump: turbine.

Well No. 7, Ha-160, located at lat 36°07'55", long 77°24'41". Driller: _____. Date drilled: 1960. Total depth: 60 ft. Diam: 6 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: upper sandy. Static water level: _____. Pump capacity: _____. Pump setting: about 30 ft. Type pump: submersible.

Well No. 8, Ha-161, located at lat 36°07'59", long 77°24'38". Driller: Layne-Atlantic Company. Date drilled: 1960. Total depth: 60 ft. Diam: _____. Cased to: 30 ft. Type of finish: screened (gravel-packed). Screened intervals: 30-35 ft, 50-55 ft. Topography: flat. Aquifer: upper sandy. Static water level: _____. Pump capacity: _____. Pump setting: about 30 ft. Type pump: submersible.

Well No. D2, Ha-162, located at lat 36°07'30", long 77°24'15". Driller: _____. Date drilled: 1963. Total depth: 260 ft. Diam: 10 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: 35 gal/min. Type pump: turbine.

Well No. D3, Ha-163, located at lat 36°07'25", long 77°23'42". Driller: _____. Date drilled: 1963. Total depth: 260 ft. Diam: 10 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: 90 gal/min. Type pump: turbine.

TOTAL USE:

Average (1974), 0.38 Mgal/d, metered; maximum daily 0.45 Mgal/d (date not available).

INDUSTRIAL USE:

Average (1974), 0.02 Mgal/d, metered. Principal users include Fulflex of the Carolinas, Inc., Carolina Wood Preserving Co., and Halifax Hosiery Mill, Inc.

SCOTLAND NECK, HALIFAX COUNTY

TREATMENT:

Water from wells 1 to 8 receives aeration, prechlorination, pressure sand filtration, addition of phosphate compounds for corrosion control, and adjustment of pH with caustic soda. Water from wells D2 and D3 receives no treatment.

RATED CAPACITY OF TREATMENT PLANT:

1.44 Mgal/d.

PUMPING CAPACITY:

Raw water, 0.68 Mgal/d; finished water, 0.5 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 210,000 gallons; one elevated tank, 500,000 gallons.

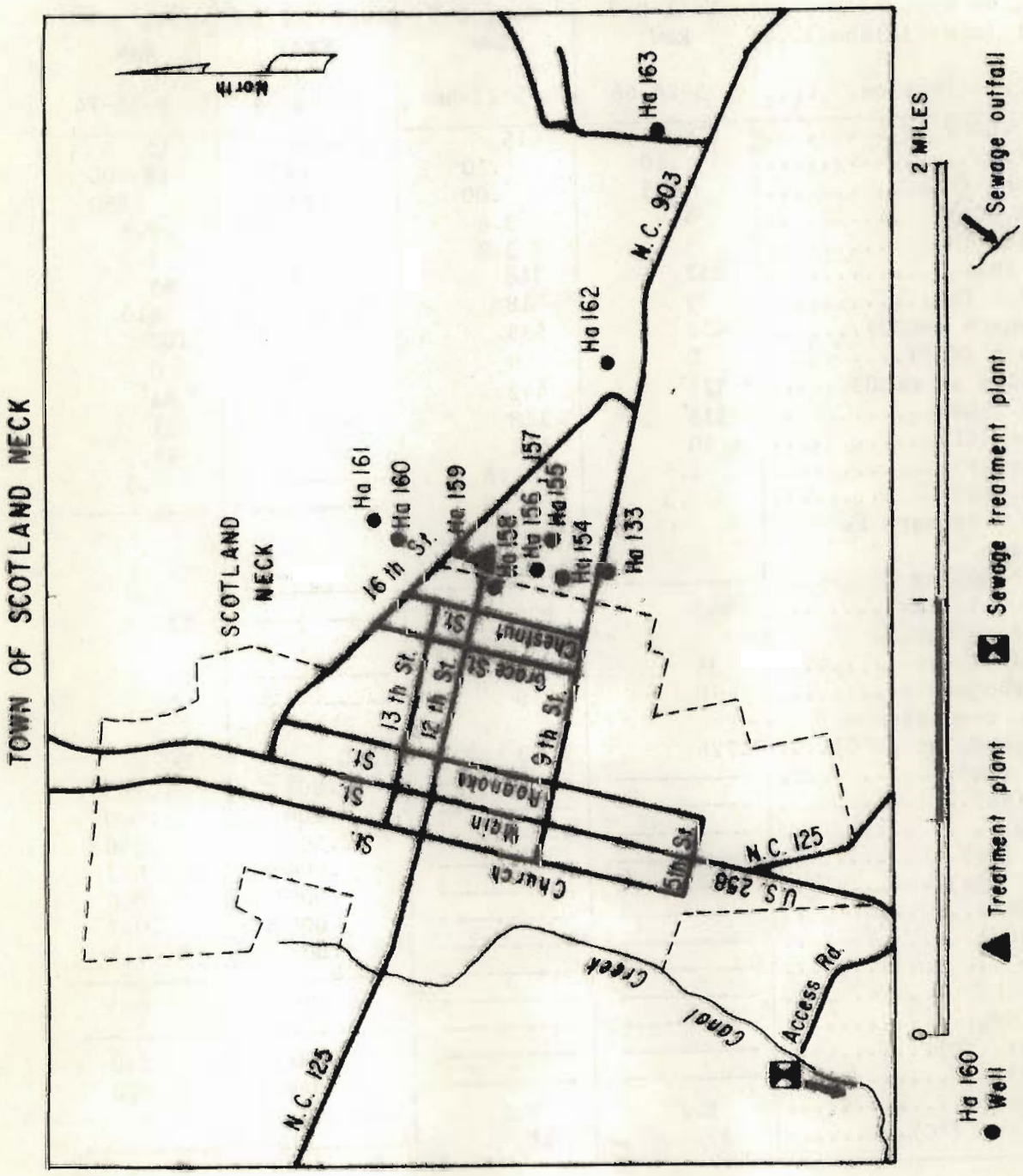
FUTURE PLANS:

To increase raw-water capacity.

WATER-RESOURCES APPRAISAL:

Surface water: Scotland Neck is located in eastern Halifax County on a low, flat divide between Deep Creek, a tributary of Fishing Creek, and Kehukee Swamp, which is tributary to the Roanoke River. The lowest measured flow on Deep Creek at the U.S. Highway 258 bridge is 0.14 Mgal/d, but the flow has probably been zero at other times. The Roanoke River with its more than ample supply lies 5 miles to the north of the town.

Ground water: The town is underlain by the upper sandy aquifer which is about 80 feet thick. This aquifer is in turn underlain by the lower sandy aquifer, which has a thickness of about 265 feet. The upper sandy aquifer contains discontinuous beds of sand that are capable of yielding from 10 to 200 gal/min to wells, with a typical yield of about 50 gal/min. The lower sandy aquifer is capable of yielding 50 to 200 gal/min to properly constructed wells. A typical yield would be over 100 gal/min. Most of the productive sands are in the upper half of this aquifer. Test holes indicate that the lower half of the aquifer tends to be excessively clayey. The water from the upper sandy aquifer may contain excessive iron, but is otherwise of excellent chemical quality. The water from the lower sandy aquifer is of good chemical quality, but there is a possibility that the water from the deepest part of the aquifer contains excessive chloride.


TOWN OF SCOTLAND NECK
SCOTLAND NECK
North
Ha 163
N.C. 903
Ha 162
Ha 161
Ha 160
Ha 159
Ha 158
Ha 156
Ha 155
Ha 154
Ha 133
157
16th St.
13th St.
12th St.
9th St.
Chestnut St.
Grace St.
St.
St.
Roanoke
Main
St.
Church
5th St.
N.C. 125
U.S. 258
Creek
Canal
Access Rd.
N.C. 125
2 MILES
0
1
Sewage outfall
Sewage treatment plant
Treatment plant
Ha 160
Well

SCOTLAND NECK, HALIFAX COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well D-2 Raw	Well D-3 Raw	Wells D2,D3[a] Raw	Wells 1-8[a] Raw
Date of collection.....	5-24-66	5-23-66	9-26-74	9-26-74
Silica (SiO_2).....	16	15	----------	15
Iron (Fe).....	.10	.10	.040	18.000
Manganese (Mn).....	.05	.00	.040	.350
Calcium (Ca).....	4.9	3.4	----------	9.6
Magnesium (Mg).....	5.1	3.2	----------	2.3
Sodium (Na).....	352	346	----------	65
Potassium (K).....	20	18	----------	4.3
Bicarbonate (HCO_3).....	452	539	----------	102
Carbonate (CO_3).....	0	0	----------	0
Alkalinity as $CaCO_3$.....	371	442	----------	84
Sulfate (SO_4).....	118	118	----------	21
Chloride (Cl).....	240	156	150	46
Fluoride (F).....	1.5	1.6	----------	.3
Nitrate (NO_3).....	.3	.3	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	1.0
Dissolved Solids.....	993	929	----------	237
Hardness as $CaCO_3$:				
Total.....	34	22	----------	34
Noncarbonate.....	0	0	----------	0
Specific conductance (micromhos at 25°C)....	1726	1573	1380	355
Arsenic (As).....	----------	----------	.001	.003
Barium (Ba).....	----------	----------	.100	.000
Boron (B).....	----------	----------	2.300	.530
Cadmium (Cd).....	----------	----------	.000	.002
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.000	.017
Copper (Cu).....	----------	----------	.003	.011
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	.000	.000
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	.080	.140
Zinc (Zn).....	----------	----------	.008	.020
pH (units).....	8.2	8.2	----------	6.3
Temperature (°C).....	17	18	----------	----------

[a] Composite sample.

SCOTLAND NECK, HALIFAX COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Wells 1-8[a] Finished			
Date of collection.....	9-26-74			
Silica (SiO_2).....	18			
Iron (Fe).....	.000			
Manganese (Mn).....	.000			
Calcium (Ca).....	12			
Magnesium (Mg).....	2.4			
Sodium (Na).....	64			
Potassium (K).....	4.4			
Bicarbonate (HCO_3).....	80			
Carbonate (CO_3).....	0			
Alkalinity as $CaCO_3$.....	66			
Sulfate (SO_4).....	22			
Chloride (Cl).....	64			
Fluoride (F).....	.5			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	1.1			
Dissolved Solids.....	232			
Hardness as $CaCO_3$:				
Total.....	40			
Noncarbonate.....	0			
Specific conductance (micromhos at 25°C)....	382			
Arsenic (As).....	.000			
Barium (Ba).....	.300			
Boron (B).....	.550			
Cadmium (Cd).....	.000			
Chromium (Cr).....	.000			
Cobalt (Co).....	.001			
Copper (Cu).....	.036			
Lead (Pb).....	----------			
Lithium (Li).....	.000			
Mercury (Hg).....	----------			
Strontium (Sr).....	.180			
Zinc (Zn).....	.010			
pH (units).....	6.2			
Temperature (°C).....	----------			

[a] Composite sample.

WELDON, HALIFAX COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 3,200 in 1974 (880 metered customers, about 100 of whom are in suburban areas).

SOURCE:

Roanoke River. The intakes are below the Roanoke Rapids Lake dam at the State Highway 48 bridge, at lat 36°28'48", long 77°38'44".

RAW-WATER STORAGE:

Reservoir, 100,000 gallons.

ALLOWABLE DRAFT:

The minimum rate of release from Roanoke Rapids Lake dam is 646 Mgal/d which is far more than Weldon's foreseeable needs.

TOTAL USE:

Average (1974), 0.3 Mgal/d, estimated; maximum daily (7-19-74), 0.348 million gallons, metered.

INDUSTRIAL USE:

0.035 Mgal/d, estimated. Principal users include J. S. Turner and Son, Inc., and Coca-Cola Bottling Co.

TREATMENT:

Prechlorination, coagulation with alum, sedimentation, addition of carbon for control of taste and odor, rapid sand filtration, adjustment of pH with soda ash and caustic soda, and postchlorination.

RATED CAPACITY OF TREATMENT PLANT:

1.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 1.6 Mgal/d; finished water, 0.5 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 500,000 gallons; two elevated tanks, 80,000 and 50,000 gallons.

WELDON, HALIFAX COUNTY

FUTURE PLANS:

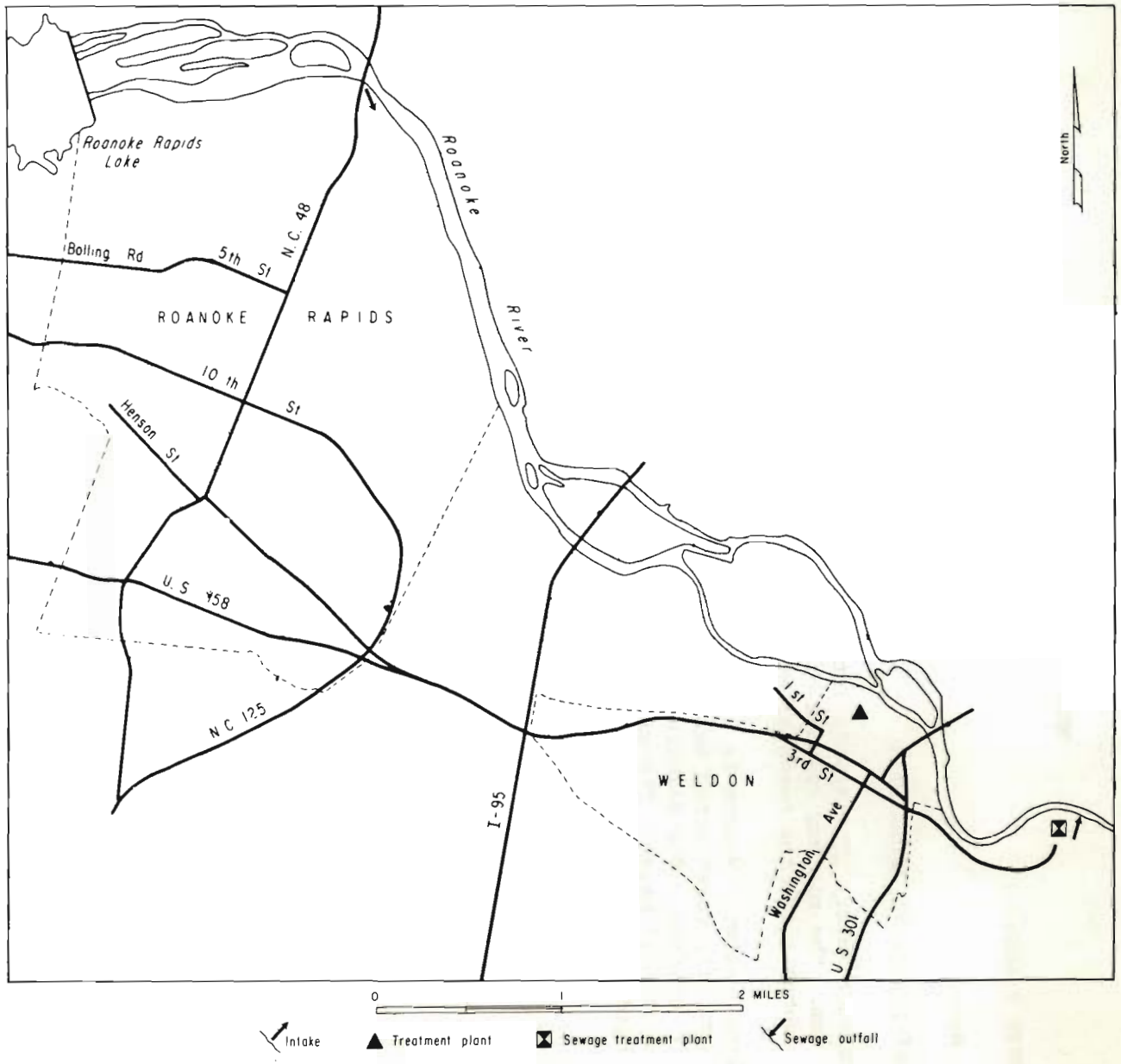
None.

WATER-RESOURCES APPRAISAL:

Surface water: The town's intake is located near the Roanoke Rapids Lake dam. The minimum release of 646 Mgal/d from the lake is far more than adequate for the needs of Weldon for the foreseeable future.

Ground water: Weldon is underlain by metamorphic rocks. The yields of properly constructed wells in these rocks might typically be about 25 gal/min. The alluvium along the river would be another possible source of water. The water from either aquifer might contain excessive hardness or iron.

TOWN OF WELDON



WELDON, HALIFAX COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Roanoke River Raw	Roanoke River Finished	Roanoke River Raw	Roanoke River Finished
Date of collection.....	5- 1-62	5- 1-62	8-22-74	8-22-74
Silica (SiO2).....	10	9.9	----------	----------
Iron (Fe).....	.07	.02	.030	.010
Manganese (Mn).....	.00	.01	.017	.017
Calcium (Ca).....	5.9	6.1	----------	----------
Magnesium (Mg).....	2.6	2.8	----------	----------
Sodium (Na).....	4.4	27	----------	----------
Potassium (K).....	1.4	1.5	----------	----------
Bicarbonate (HCO3).....	31	65	----------	----------
Carbonate (CO3).....	0	0	----------	----------
Alkalinity as CaCO3.....	25	53	----------	----------
Sulfate (SO4).....	6.8	27	----------	----------
Chloride (Cl).....	3.5	5.6	4.2	6.9
Fluoride (F).....	.1	.0	----------	----------
Nitrate (NO3).....	.4	.4	----------	----------
Nitrite + Nitrate as Nitrogen (NO2 + NO3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	55	112	----------	----------
Hardness as CaCO3:				
Total.....	28	28	----------	----------
Noncarbonate.....	2	0	----------	----------
Specific conductance (micromhos at 25°C)....	83	190	87	100
Arsenic (As).....	----------	----------	.001	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.050	.020
Cadmium (Cd).....	----------	----------	.001	.001
Chromium (Cr).....	----------	----------	.001	.000
Cobalt (Co).....	----------	----------	.013	.016
Copper (Cu).....	----------	----------	.003	.009
Lead (Pb).....	----------	----------	.001	.002
Lithium (Li).....	----------	----------	.000	.000
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	.090	.090
Zinc (Zn).....	----------	----------	.000	.050
pH (units).....	6.6	7.9	----------	----------
Temperature (°C).....	----------	----------	----------	----------

HERTFORD COUNTY

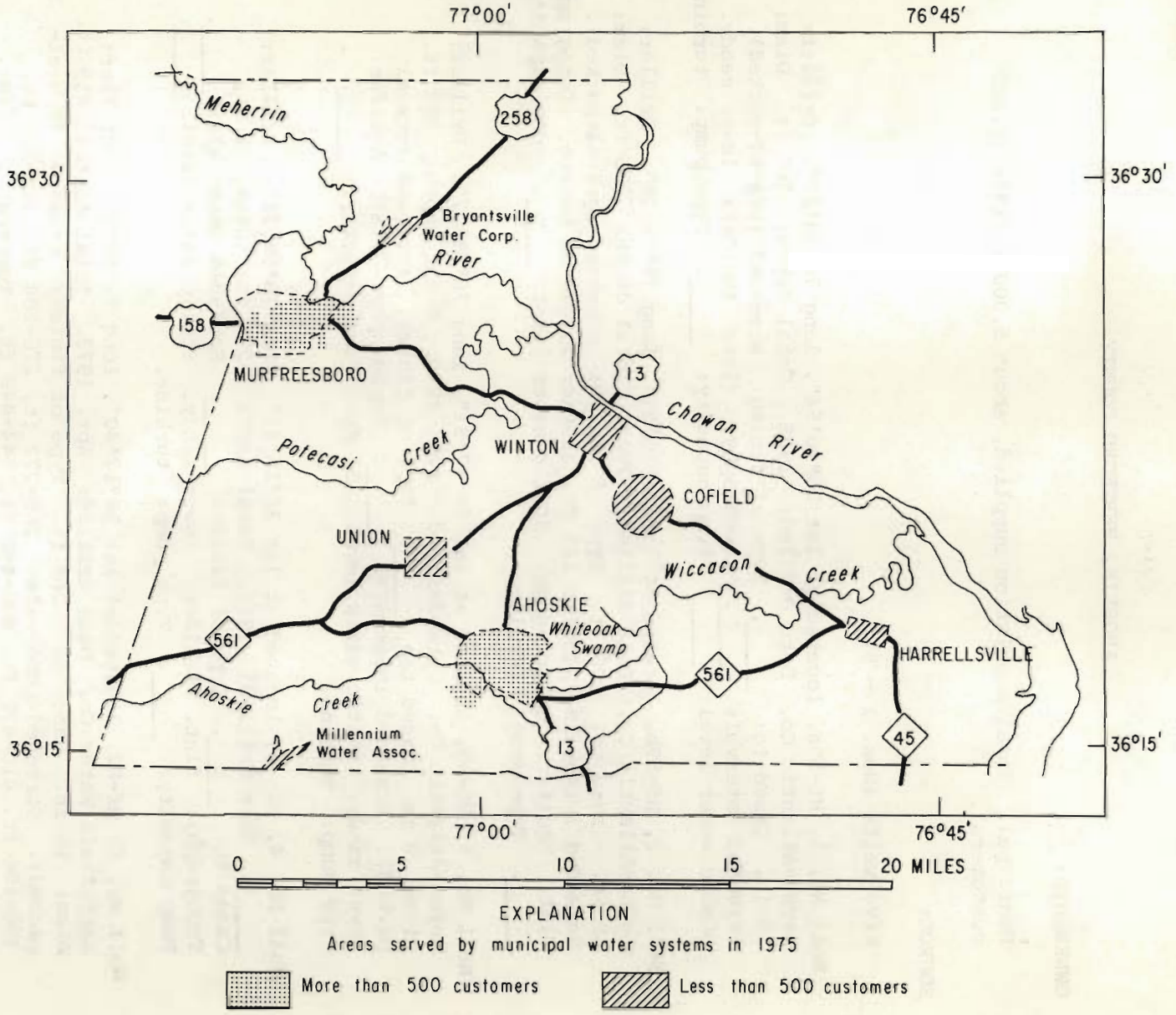
WATER-RESOURCES APPRAISAL

Hertford County is located in the north-central part of the North Carolina Coastal Plain. The topography is low and flat. Many of the water courses are swampy. Drainage is to the Chowan River and its tributaries, the largest of which is the Meherrin River. The Chowan River is estuarine throughout its length. At a point slightly north of the U. S. Route 13 bridge over the Chowan, the water is always fresh and the low flows are many millions of gallons per day. Although the low-flow characteristics of the Meherrin River are not well-known, the low-flow discharge of this river as it enters the county should be on the order of several million gallons per day, while at its mouth the low-flow discharge should be about 20 Mgal/d. Most of the streams in the county go dry in drought, even those having drainage areas as large as 190 square miles. The average stream discharge is 0.71 $(Mgal/d)mi^2$. There is virtually no stream regulation.

There are two public water supplies having 500 or more customers in the county. These are Ahoskie and Murfreesboro, both of which obtain their supplies from ground water. The smaller public water supplies and virtually all individual and commercial supplies are from ground water. There are some industrial withdrawals from surface water in the county. The county population in 1970 was 23,529.

The county is underlain by an eastward-thickening sequence of alternating sands and clays. At the northwest corner of the county their total thickness is about 450 feet, while at the southeast corner of the county their thickness is about 1,500 feet. The upper sandy aquifer averages about 100 feet thick in the county. The lower sandy aquifer comprises the remainder of the deposits. In the western two-thirds of the county, the lower sandy aquifer contains only fresh water, whereas in the eastern third of the county, only about the upper 400 to 600 feet contains fresh water. Where the lower sandy aquifer is thinnest or the depth to brackish water shallowest, yields of up to 1,000 gal/min can be obtained. Where the fresh-water thickness in the lower sandy aquifer is greatest, well yields of considerably over 1,000 gal/min, possibly as much as 2,000 gal/min can be developed. The maximum availability of ground water in the county is estimated at 0.9 $(Mgal/d)/mi^2$. This is the amount that could be produced by closely-spaced shallow wells. However, the maximum rate of recharge to the lower sandy aquifer is estimated at 0.06 $(Mgal/d)/mi^2$. With such a small potential recharge rate, high-yielding wells should be spaced adequately in order to prevent excessive mutual well interference. The water from the upper sandy aquifer tends to be corrosive and may contain excessive iron. The fresh water from the lower sandy aquifer tends to be soft and alkaline, with a moderate to high dissolved-solids concentration, and may contain excessive fluoride.

HERTFORD COUNTY



AHOSKIE, HERTFORD COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 5,000 in 1974 (1,850 customers).

SOURCE:

Five wells (Nos. 1 - 5)

Well No. 1, Hf-59a, located at lat 36°16'54", long 76°59'17". Driller: Layne-Atlantic Co. Date drilled: 1928. Total depth: 265 ft. Diam: 18 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: _____. Type pump: turbine.

Well No. 2, Hf-59b, located at lat 36°16'55", long 76°59'18". Driller: Layne-Atlantic Co. Date drilled: 1939. Total depth: 265 ft. Diam: 18 in. Cased to: 100 ft. Type of finish: screened (gravel-packed). Screened intervals: 100 to 145 ft, another screen at bottom. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: _____. Type pump: turbine.

Well No. 3, Hf-60, located at lat 36°17'31", long 76°59'22". Driller: Layne-Atlantic Co. Date drilled: Feb. 1950. Total depth: 202 ft. Diam: 8 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: 37 ft. Pump capacity: _____. Type pump: turbine.

Well No. 4, Hf-79, located at lat 36°16'55", long 76°58'33". Driller: _____. Date drilled: 1959. Total depth: 296 ft. Diam: 8 in. Cased to: _____. Type of finish: _____. Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: _____. Type pump: turbine.

Well No. 5, Hf-82, located at lat 36°17'40", long 76°58'40". Driller: Hartsfield Water Co. Date drilled: Apr. 1973. Total depth: 453 ft. Diam: 10 in. Cased to: 268 ft. Type of finish: screened (gravel-packed). Screened intervals: 268-272 ft, 276-284 ft, 318-330 ft, 396-404 ft, 410-422 ft, 428-440 ft, 444-448 ft. Topography: flat. Aquifer: lower sandy. Static water level: 35 ft. Well yield: 500 gal/min. Pump capacity: _____. Type pump: turbine.

TOTAL USE:

Average (1974) 0.5 Mgal/d estimated. Maximum daily 0.6 million gallons, no date available.

AHOSKIE, HERTFORD COUNTY

INDUSTRIAL USE:

0.022 Mgal/d estimated. Principal users include Aetna Corp. and Wolverine Trailer Corp.

TREATMENT:

Aeration (wells No. 3, 4, and 5).

PUMPING CAPACITY:

1.7 Mgal/d.

WATER STORAGE:

One ground tank 100,000 gallons; one pressure tank 10,000 gallons; two elevated tanks 500,000 and 200,000 gallons.

FUTURE PLANS:

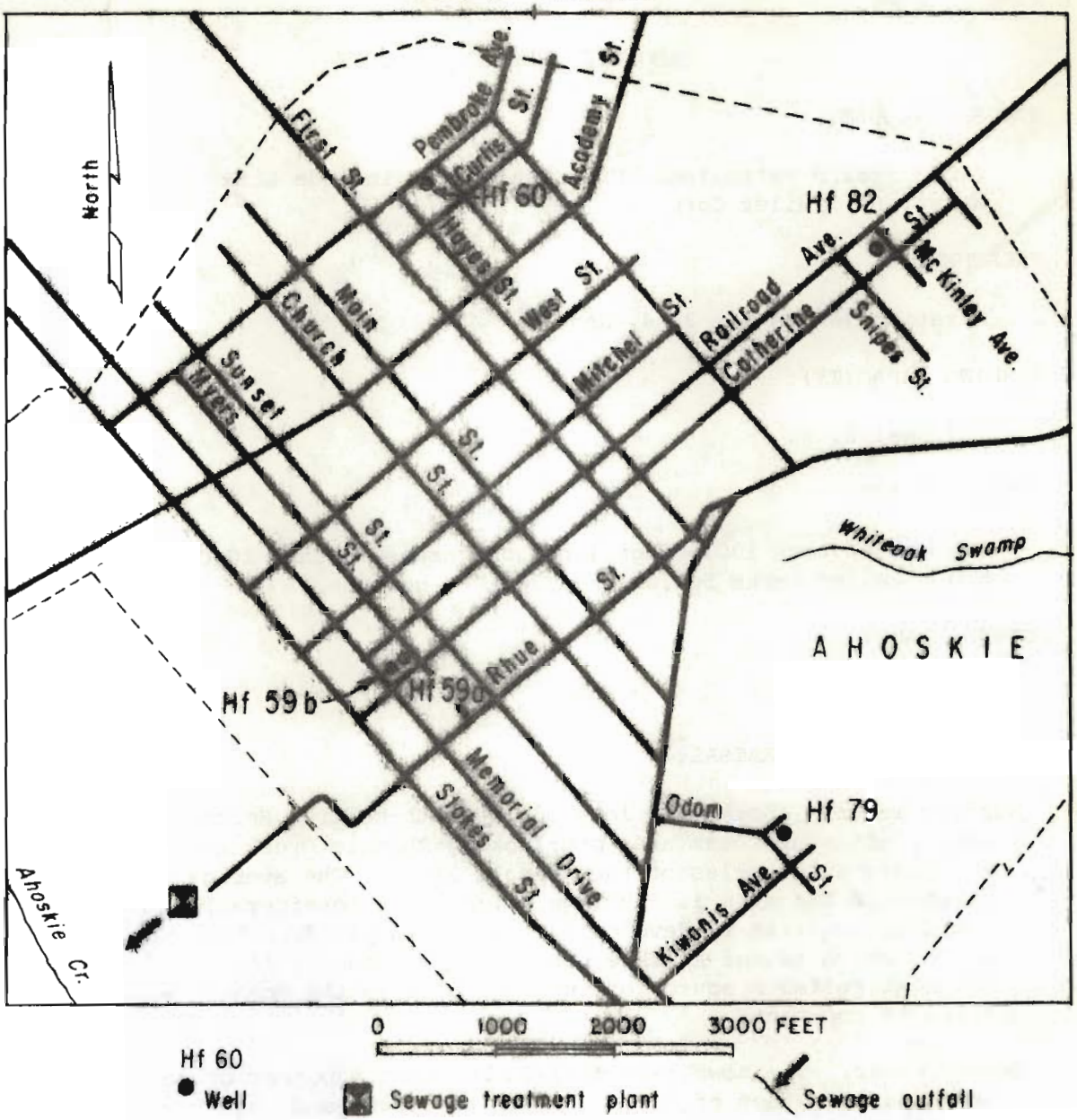
None.

WATER-RESOURCES APPRAISAL:

Surface water: Ahoskie is located in south-central Hertford County on a low, flat interstream area overlooking Ahoskie Creek and Whiteoak Swamp, which are tributaries of the Roanoke River. The average discharge of streams in the area is 0.7 $(Mgal/d)/mi^2$. A considerable impoundment would be required to develop a reliable supply from the nearby streams, all of which except Ahoskie Creek have a tendency to go dry in drought. The most reliable source of surface water is the Roanoke River, nine miles to the north.

Ground water: The town is underlain by about 800 feet of sands and clays. Less than 100 feet of these are of the upper sandy aquifer; the remainder are of the lower sandy aquifer. The depth to brackish water in the area is not known, but is probably in excess of 550 feet. Fresh water yields of over 1,000 gal/min can be obtained from properly constructed wells. Water from wells less than 100 feet deep generally is soft to slightly hard and acidic, has a low dissolved-solids concentration and, commonly, an excessive iron concentration. Water from wells to a depth of about 300 feet generally is soft and slightly alkaline and has a moderately high dissolved-solids concentration. Fresh water from very deep wells is very soft, very alkaline and has excessive concentrations of dissolved-solids and fluoride.

TOWN OF AHOSKIE



AHOSKIE, HERTFORD COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1	Well No. 2	Well No. 3	Well No. 4
Date of collection.....	5-24-66	5-24-66	5-24-66	5-24-66
Silica (SiO_2).....	30	31	35	31
Iron (Fe).....	.31	.06	.16	.10
Manganese (Mn).....	.02	.01	.00	.01
Calcium (Ca).....	4.7	7.1	16	8.5
Magnesium (Mg).....	2.0	5.6	6.1	4.2
Sodium (Na).....	210	82	58	83
Potassium (K).....	15	10	10	10
Bicarbonate (HCO_3).....	415	278	228	274
Carbonate (CO_3).....	0	0	0	0
Alkalinity as $CaCO_3$.....	340	228	187	225
Sulfate (SO_4).....	66	3.0	4.0	2.6
Chloride (Cl).....	55	5.7	8.5	5.9
Fluoride (F).....	1.9	.6	.4	.5
Nitrate (NO_3).....	.3	.3	.4	.4
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	592	283	251	283
Hardness as $CaCO_3$:				
Total.....	20	42	66	38
Noncarbonate.....	0	0	0	0
Specific conductance (micromhos at 25°C)....	946	448	387	442
Arsenic (As).....	----------	----------	----------	----------
Barium (Ba).....	----------	----------	----------	----------
Boron (B).....	----------	----------	----------	----------
Cadmium (Cd).....	----------	----------	----------	----------
Chromium (Cr).....	----------	----------	----------	----------
Cobalt (Co).....	----------	----------	----------	----------
Copper (Cu).....	----------	----------	----------	----------
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	----------
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	----------
Zinc (Zn).....	----------	----------	----------	----------
pH (units).....	7.5	7.8	7.6	7.6
Temperature (°C).....	16	18	17	17

AHOSKIE, HERTFORD COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Wells 1-4[a/]			
Date of collection.....	8- 8-74			
Silica (SiO_2).....	----------			
Iron (Fe).....	.010			
Manganese (Mn).....	.000			
Calcium (Ca).....	----------			
Magnesium (Mg).....	----------			
Sodium (Na).....	----------			
Potassium (K).....	----------			
Bicarbonate (HCO_3).....	----------			
Carbonate (CO_3).....	----------			
Alkalinity as $CaCO_3$.....	----------			
Sulfate (SO_4).....	----------			
Chloride (Cl).....	7.5			
Fluoride (F).....	----------			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------			
Dissolved Solids.....	----------			
Hardness as $CaCO_3$:				
Total.....	----------			
Noncarbonate.....	----------			
Specific conductance (micromhos at 25°C)....	350			
Arsenic (As).....	.000			
Barium (Ba).....	.000			
Boron (B).....	.470			
Cadmium (Cd).....	.000			
Chromium (Cr).....	.000			
Cobalt (Co).....	.003			
Copper (Cu).....	.009			
Lead (Pb).....	----------			
Lithium (Li).....	.005			
Mercury (Hg).....	----------			
Strontium (Sr).....	.180			
Zinc (Zn).....	.040			
pH (units).....	----------			
Temperature (°C).....	----------			

[a/] Composite sample.

MURFREESBORO, HERTFORD COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 4,000 in 1974 (about 1,000 metered customers).

SOURCE:

Two wells (Nos. 1 and 2).

Well No. 1, Hf-80, located at lat 36°26'36", long 77°06'03". Driller: Layne Atlantic Co. Date drilled: Dec. 1969. Total depth: 630 ft. Diam: 20 to 8 in. Cased to: 380 ft. Type of finish: screened (gravel-packed). Intervals screened: 380-410 ft, 475-495 ft, 514-524 ft, 575-595 ft, 615-625 ft. Topography: flat. Aquifer: lower sandy. Static water level: 112 ft. Well yield: 1,000 gal/min Pump capacity: 500 gal/min. Pump setting: 235 ft. Type pump: turbine.

Well No. 2, Hf-81, located at lat 36°25'34", long 77°06'21". Driller: Singer-Layne Atlantic Co. Date drilled: July 1972. Total depth: 600 ft. Diam: 20 to 8 in. Cased to: 398 ft. Type of finish: screened (gravel-packed). Intervals screened: 398-428 ft, 440-450 ft, 484-514 ft, 532-542 ft, 584-594 ft. Topography: flat. Aquifer: lower sandy. Static water level: 129 ft. Well yield: 1,000 gal/min. Pump capacity: 1,000 gal/min. Type pump: turbine.

TOTAL USE:

Average (1974) 0.3 Mgal/d, estimated; maximum daily 0.36 Mgal/d (date not available).

INDUSTRIAL USE:

0.05 Mgal/d estimated. Principal users include Georgia-Pacific Corp. and Fram Corp.

TREATMENT:

None.

PUMPING CAPACITY:

2.0 Mgal/d.

RAW-WATER STORAGE:

One elevated tank, 75,000 gallons.

MURFREESBORO, HERTFORD COUNTY

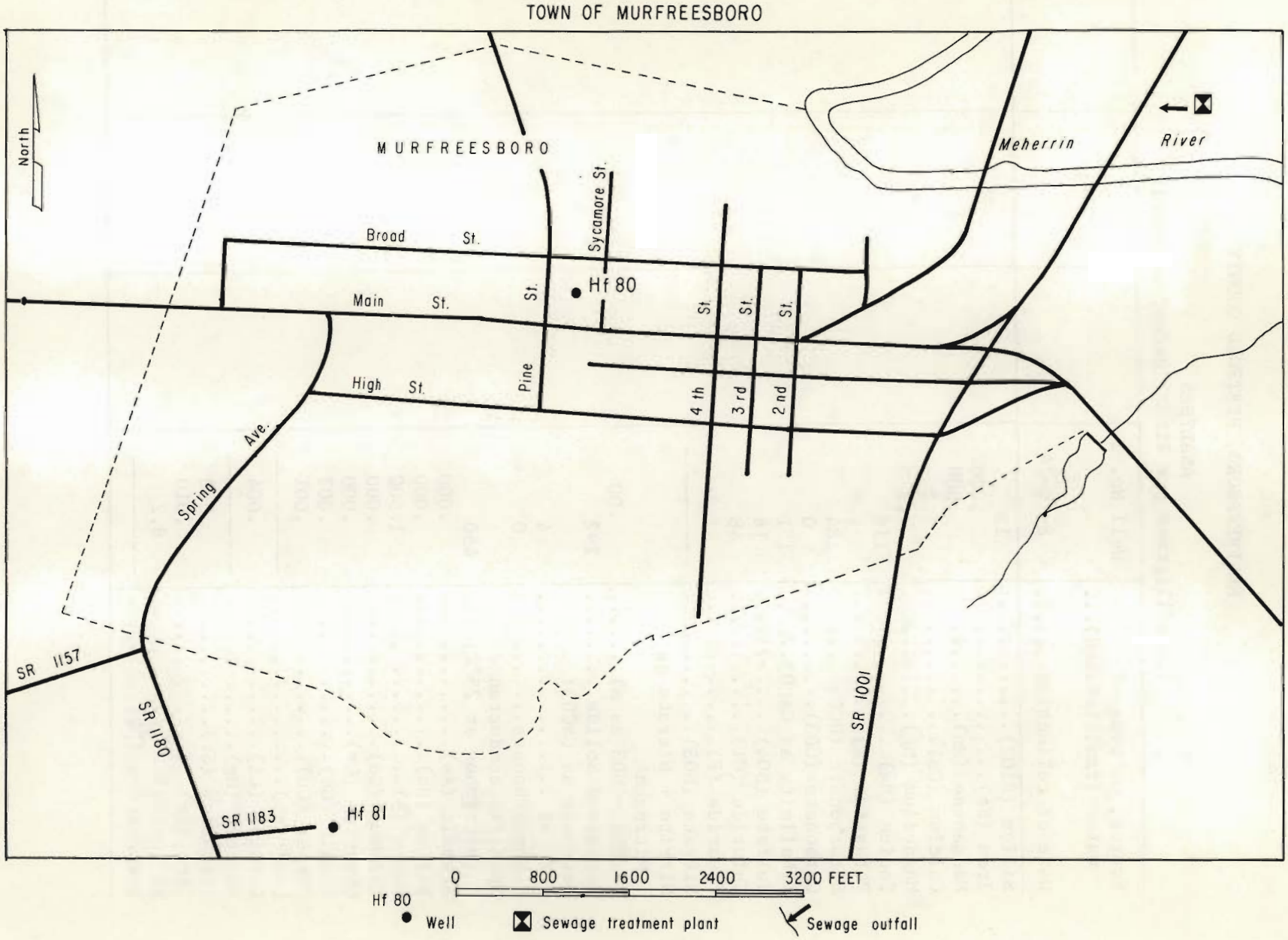
FUTURE PLANS:

None.

WATER-RESOURCES APPRAISAL:

Surface water: Murfreesboro is located on a low flat area overlooking the Meherrin River. The low flow of the Meherrin River at the town is in excess of 10 Mgal/d, which would be more than enough for any foreseeable need.

Ground water: The town is underlain by about 700 feet of alternating beds of sand, gravel, and clay. About 100 feet of these deposits belong to the upper sandy aquifer; the remainder to the lower sandy aquifer. Well yields up to about 1,500 gal/min can be obtained from the lower sandy aquifer. The water from the lower sandy aquifer tends to be very soft and alkaline and has a moderate to high dissolved-solids concentration. Some wells in this aquifer yield water containing excessive iron or fluoride.


TOWN OF MURFREESBORO
North
MURFREESBORO
Meherrin River
Broad St.
Sycamore St.
Main St.
Hf 80
Pine St.
High St.
4th St.
3rd St.
2nd St.
Spring Ave.
SR 1157
SR 1180
SR 1183
Hf 81
SR 1001
0 800 1600 2400 3200 FEET
Hf 80 Well
Sewage treatment plant
Sewage outfall

MURFREESBORO, HERTFORD COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 2			
Date of collection.....	8- 9-74			
Silica (SiO_2).....	17			
Iron (Fe).....	.020			
Manganese (Mn).....	.000			
Calcium (Ca).....	1.3			
Magnesium (Mg).....	.2			
Sodium (Na).....	110			
Potassium (K).....	4.6			
Bicarbonate (HCO_3).....	184			
Carbonate (CO_3).....	0			
Alkalinity as $CaCO_3$.....	151			
Sulfate (SO_4).....	18			
Chloride (Cl).....	48			
Fluoride (F).....	.3			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.00			
Dissolved Solids.....	292			
Hardness as $CaCO_3$:				
Total.....	4			
Noncarbonate.....	0			
Specific conductance (micromhos at 25°C)....	450			
Arsenic (As).....	.000			
Barium (Ba).....	.000			
Boron (B).....	1.500			
Cadmium (Cd).....	.000			
Chromium (Cr).....	.000			
Cobalt (Co).....	.003			
Copper (Cu).....	.001			
Lead (Pb).....	----------			
Lithium (Li).....	.004			
Mercury (Hg).....	----------			
Strontium (Sr).....	.030			
Zinc (Zn).....	.010			
pH (units).....	8.2			
Temperature (°C).....	----------			

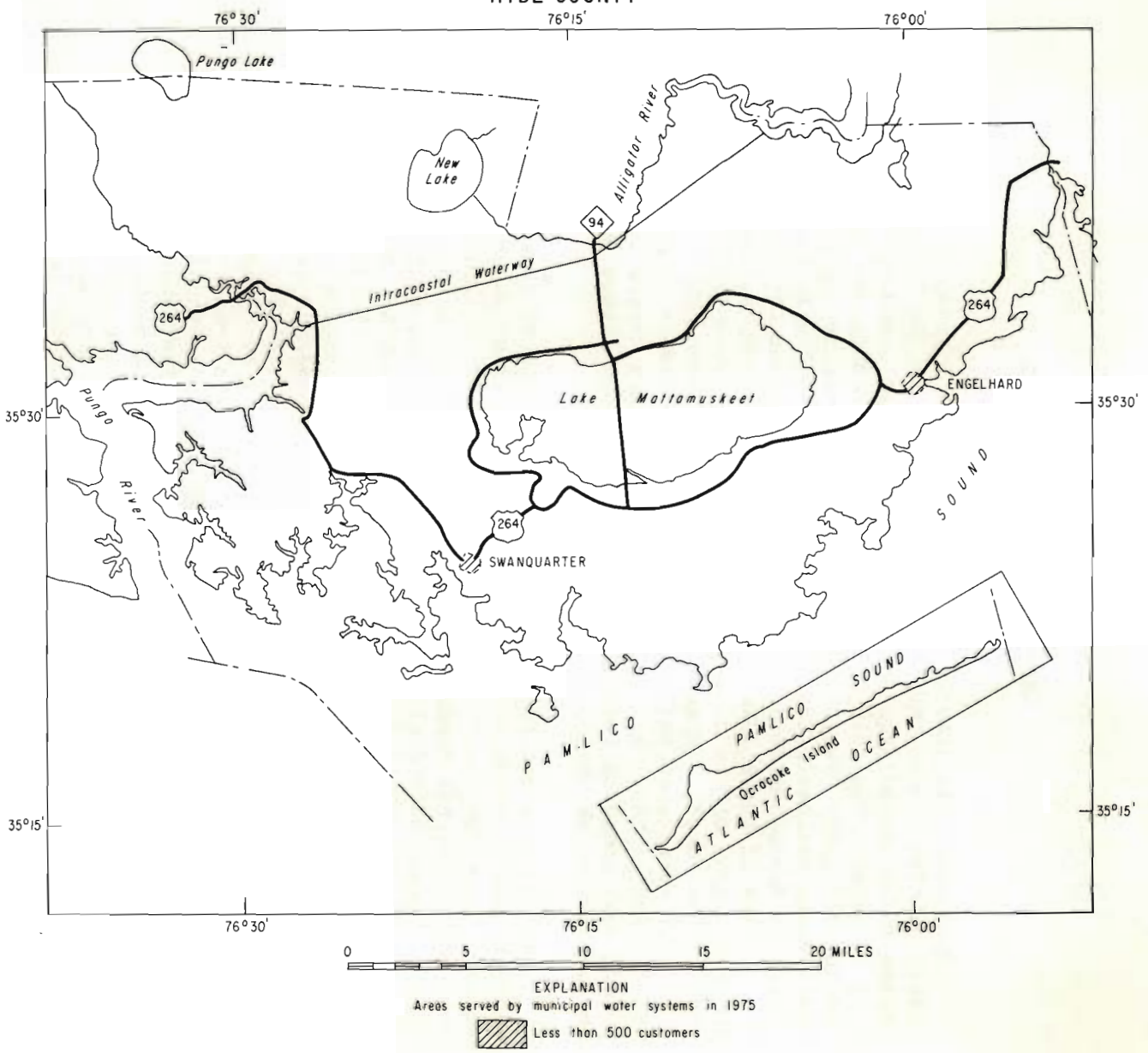
HYDE COUNTY

WATER-RESOURCES APPRAISAL

Hyde County is located in the east-central Coastal Plain of North Carolina. The county includes Ocracoke Island on the Outer Banks. The island is separated from the mainland by Pamlico Sound, a large, brackish body of water. The only major streams in the county are the Pungo River and the Alligator River. These rivers are estuarine and brackish in their lower reaches. The county is traversed by the Intracoastal Waterway. There are two major lakes in the area, New Lake and Lake Mattamuskeet. The volumes of these lakes are 4.8 and 34.7 billion gallons respectively. The topography of the county is very flat, with swampland prevailing in much of the county. Most of the swampland has been drained for agricultural use. The average streamflow for mainland Hyde County is estimated at 0.71 $(Mgal/d)/mi^2$. There are no public water supplies having 500 customers or more. Most commercial and private supplies are obtained from ground water. The population of the county in 1970 was 5,571.

Although the county is underlain by thousands of feet of sedimentary deposits only the top few hundred feet contain fresh water. In the northwest corner of the county, the depth to salty water is in excess of 400 feet. Here, up to several thousand gallons per minute of fresh water can be obtained from individual wells tapping the limestone aquifer. Wells in the upper sandy aquifer overlying the limestone aquifer can yield several hundred gallons per minute of fresh water. The thickness of the fresh water layer diminishes to the southeast. In the vicinity of Pamlico Sound and Lake Mattamuskeet, yields of as much as 50 gal/min are obtainable from the fresh-water zone which is less than 100-feet thick. Yields of as much as 50 gal/min are also obtainable from the upper sandy aquifer on Ocracoke Island. But, in both instances, the threat of salt-water intrusion would make a lower sustained yield prudent. The maximum ground-water yeild on the mainland is estimated at 1.0 $(Mgal/d)/mi^2$. The water from the limestone aquifer tends to be hard and alkaline and to contain hydrogen sulfide. The water from the upper sandy aquifer may range from soft to extremely hard, with a high pH, a moderate to high dissolved-solids concentration, and, commonly, an excessive iron concentration.

HYDE COUNTY


76°30'
76°15'
76°00'
Pungo Lake
New Lake
Alligator River
94
Intracoastal Waterway
264
Lake Mattamuskeet
ENGELHARD
35°30'
Pungo River
SOUND
SWANQUARTER
PAMLICO SOUND
Ocracoke Island
ATLANTIC OCEAN
35°15'
0 5 10 15 20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
Less than 500 customers

MARTIN COUNTY

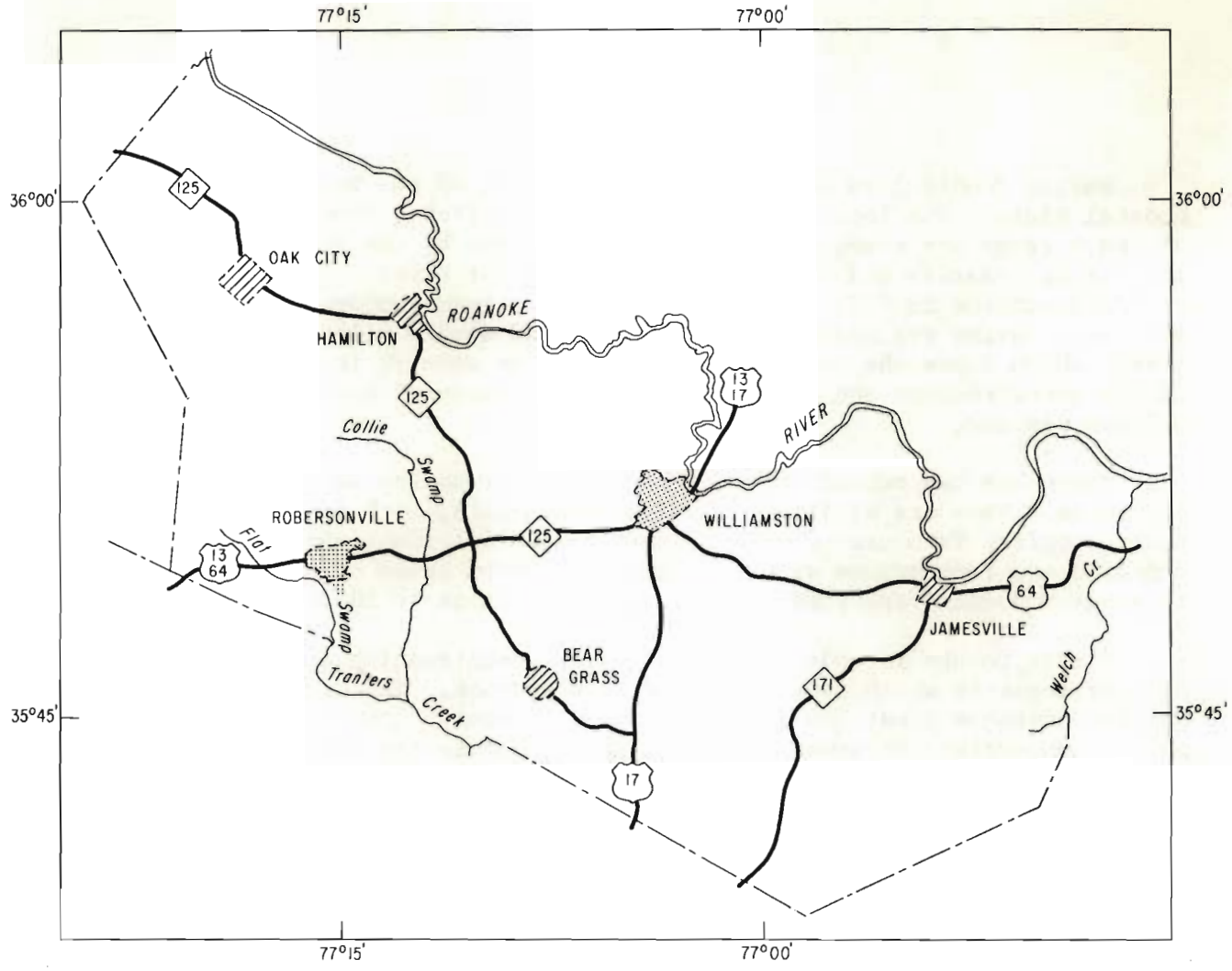
WATER-RESOURCES APPRAISAL

Martin County lies in the northeastern part of the North Carolina Coastal Plain. The topography of the county is flat. The flood plains of the streams are swampy. The county is drained by the Roanoke River and its tributaries and by tributaries of the Tar River. The average stream discharge is 0.71 (Mgal/d)/mi^2. Most streams go dry in drought, even some having drainage areas as large as 40 square miles. The Roanoke River, which forms the northern boundary of the county, is highly regulated in its upper reaches and has a minimum flow of several hundred million gallons per day.

There are two public supplies in the county having 500 or more customers. They are Williamston and Robersonville, both of which obtain their supplies from ground water. Most small individual and commercial supplies are from ground water. There is a heavy usage of surface water in wood-products operations. The county population in 1970 was 6,570. 24730

Martin County is underlain by an eastward-thickening wedge of sedimentary deposits which overlie crystalline bedrock. The upper sandy aquifer averages about 100 feet thick in the county. The lower sandy aquifer underlies the upper sandy aquifer except in the eastern one-fourth of the county, where the limestone aquifer is present and reaches a maximum thickness of about 100 feet. The depth to crystalline rock is about 400 feet in the western part of the county increasing to a maximum of slightly less than 2,000 feet in the eastern part of the county. Only about the upper 400 or 500 feet of the sediment contain fresh water. The lower sandy aquifer alone, or in combination with the limestone aquifer where present is capable of yielding from several hundred to more than a thousand gallons per minute of fresh water to properly constructed wells almost anywhere in the county. The maximum amount of ground water available is estimated at 0.9 (Mgal/d)/mi^2. However, the maximum recharge that can be induced to the lower sandy aquifer is estimated at 0.06 (Mgal/d)/mi^2. Fresh ground water in the county tends to be hard, except for the water from some very shallow or very deep wells. Where a deep well yields soft water, the fluoride content is likely to be excessive. Shallow wells normally yield water that is slightly acid and contains excessive iron. The water from deep wells is normally alkaline and may or may not contain excessive iron.

MARTIN COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

Less than 500 customers

ROBERSONVILLE, MARTIN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 2,600 in 1974 (about 800 customers).

SOURCE:

Four wells (Nos. 1 - 4).

Well No. 1, Mr-110, located at lat 35°49'10", long 77°15'22". Driller: B. F. Cobunn. Date drilled: 1940. Total depth: 390 ft. Diam: 10 in to 8 in. Cased to: _____. Type of finish: screened. Screened intervals: 20 ft of screen, setting unknown. Topography: valley. Aquifer: lower sandy. Static water level: 35 ft (?). Pump capacity: 250 gal/min. Type pump: turbine.

Well No. 2, Mr-109, located at lat 35°49'13", long 77°15'20". Driller: B. F. Cobunn. Date drilled: 1933. Total depth: 390 ft. Diam: 10 in to 8 in. Cased to: _____. Type of finish: screened. Screened intervals: 20 ft of screen, setting unknown. Topography: valley. Aquifer: lower sandy. Static water level: 35 ft. Pump capacity: 400 gal/min. Type pump: turbine.

Well No. 3, Mr-420, located at lat 35°49'32", long 77°15'59". Driller: _____. Date drilled: March 1964. Total depth: 325 ft (?). Diam: 12 in to 10 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: 155-165 ft, 204-209 ft, 245-260 ft, 279-284 ft, 300-320 ft. Topography: valley. Aquifer: lower sandy. Static water level: _____. Well yield: 500 gal/min. Pump capacity: 500 gal/min. Type pump: turbine.

Well No. 4, Mr-421, located at lat 35°49'43", long 77°14'33". Driller: R. L. Magette Co. Date drilled: April 1970. Total depth: drilled to 407 ft, finished at 348 ft. Diam: 16 in to 8 in. Cased to: 284 ft. Type of finish: screened (gravel-packed). Screened intervals: 284-294 ft, 306-316 ft, 338-348 ft. Topography: flat. Aquifer: lower sandy. Static water level: 60 ft. Well yield: 300 gal/min. Pump capacity: 300 gal/min. Type pump: submersible.

TOTAL USE:

Average estimated at 1.0 Mgal/d. Maximum daily use estimated at 1.2 million gallons.

INDUSTRIAL USE:

0.7 Mgal/d, estimated. Principal users include Central Soya, Robersonville Products Co., Blue Ridge Shoe Co., and Southern Apparel, Inc.

ROBERSONVILLE, MARTIN COUNTY

TREATMENT:

Partial chlorination at wells.

PUMPING CAPACITY:

2.1 Mgal/d.

FINISHED-WATER STORAGE:

Two elevated tanks, 300,000 and 100,000 gallons. One ground tank, 75,000 gallons.

FUTURE PLANS:

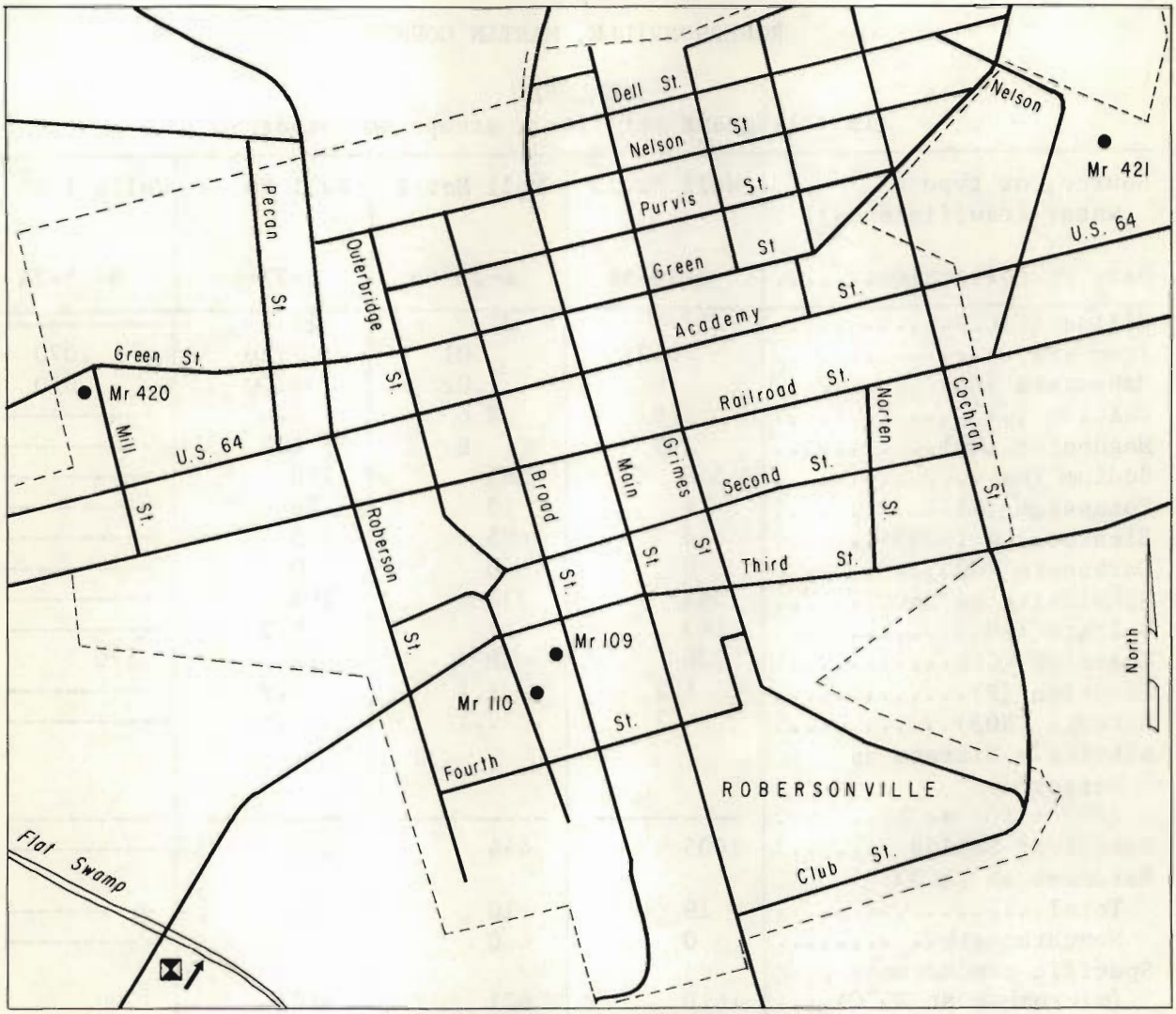
None.

WATER-RESOURCES APPRAISAL:

Surface water: Robersonville is located in the southwestern corner of the county on a low, flat ridge between Flat and Collie Swamps. The average stream discharge is 0.71 (Mgal/d)/mi^2. Some of the streams in the vicinity go dry in drought. It is probable that a large impoundment would be required for a dependable surface-water supply.

Ground water: The town is underlain by about 700 feet of sands and clays. Only about the upper 400 feet of these deposits contain fresh water. Less than 100 feet of these deposits belong to the upper sandy aquifer; the remainder are of the lower sandy aquifer. Fresh-water yields of a few hundred gallons per minute can be obtained by a properly constructed well in these deposits. Fresh water from deep wells in the lower sandy aquifer is commonly very soft and highly alkaline, with a moderately high dissolved-solids concentration and may contain excessive fluoride. Sulfate concentrations in the ground water are highly variable but not excessive.

TOWN OF ROBERSONVILLE



ROBERSONVILLE, MARTIN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1	Well No. 2	Well No. 3	Wells 1-4[a]
Date of collection.....	6-20-66	6-20-66	5-22-64	8- 5-74
Silica (SiO2).....	22	21	19	----------
Iron (Fe).....	.02	.01	.10	.070
Manganese (Mn).....	.01	.02	.00	.020
Calcium (Ca).....	2.9	2.6	6.4	----------
Magnesium (Mg).....	2.9	.8	4.7	----------
Sodium (Na).....	358	163	128	----------
Potassium (K).....	14	10	16	----------
Bicarbonate (HCO3).....	444	405	375	----------
Carbonate (CO3).....	0	0	0	----------
Alkalinity as CaCO3.....	364	332	308	----------
Sulfate (SO4).....	143	15	5.2	----------
Chloride (Cl).....	230	28	11	170
Fluoride (F).....	1.1	1.1	.9	----------
Nitrate (NO3).....	.1	.1	.6	----------
Nitrite + Nitrate as Nitrogen (NO2 + NO3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	1005	444	385	----------
Hardness as CaCO3:				
Total.....	19	10	36	----------
Noncarbonate.....	0	0	0	----------
Specific conductance (micromhos at 25°C)....	1610	671	618	1300
Arsenic (As).....	----------	----------	----------	.001
Barium (Ba).....	----------	----------	----------	.000
Boron (B).....	----------	----------	----------	2.000
Cadmium (Cd).....	----------	----------	----------	.001
Chromium (Cr).....	----------	----------	----------	.000
Cobalt (Co).....	----------	----------	----------	.003
Copper (Cu).....	----------	----------	----------	.003
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	.008
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	.060
Zinc (Zn).....	----------	----------	----------	.010
pH (units).....	7.5	7.5	8.2	----------
Temperature (°C).....	18	18	18	----------

[a] Composite sample.

WILLIAMSTON, MARTIN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 7,000 in 1974 (2,300 metered customers).

SOURCE:

Four wells (Nos. 201, 203, 206, 211).

Well No. 201, Mr 201, located at lat 35°51'11", long 77°03'38". Driller: Heater Well Co. Date drilled: Jan. 1957. Total depth: 460 ft. Diam: 12 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: 100 ft. Pump capacity: 550 gal/min. Type pump: turbine.

Well No. 203, Mr 203, located at lat 35°50'42", long 77°03'58". Driller: _____. Date drilled: 1960. Total depth: 450 ft. Diam: 10 in to 8 in. Cased to: _____. Type of finish: _____. Screened intervals: _____. Topography: hilltop. Aquifer: lower sandy. Static water level: 37 ft. Pump capacity: 550 gal/min. Type pump: turbine.

Well No. 206, Mr 206, located at lat 35°51'01", long 77°03'36". Driller: Layne Atlantic Co. Date drilled: 1951. Total depth: 470 ft. Diam: 20 in to 8 in. Cased to: _____. Type of finish: _____. Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: 300 gal/min. Type pump: turbine.

Well No. 211, Mr 211, located at lat 35°50'29", long 77°04'04". Driller: Layne Atlantic Co. Date drilled: 1946. Total depth: 452 ft. Diam: 8 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: 110 ft. Pump capacity: 200 gal/min. Type pump: turbine.

TOTAL USE:

Average (July 1973 - June 1974), 0.672 Mgal/d, metered; maximum daily, 1.1 million gallons, estimated.

INDUSTRIAL USE:

0.22 Mgal/d, estimated. Principal users include Jefferson Mills, Williamston Packing Co., and Williamston Meat Processing Co.

WILLIAMSTON, MARTIN COUNTY

TREATMENT:

Water from well No. 206 is chlorinated at the well. The water from the other wells is untreated.

PUMPING CAPACITY:

2.3 Mgal/d.

WATER STORAGE:

Three elevated tanks: 300,000; 300,000 (150,000 gallons reserved for industrial fire-fighting); and 75,000 gallons. One ground tank, 300,000 gallons for emergency use.

FUTURE PLANS:

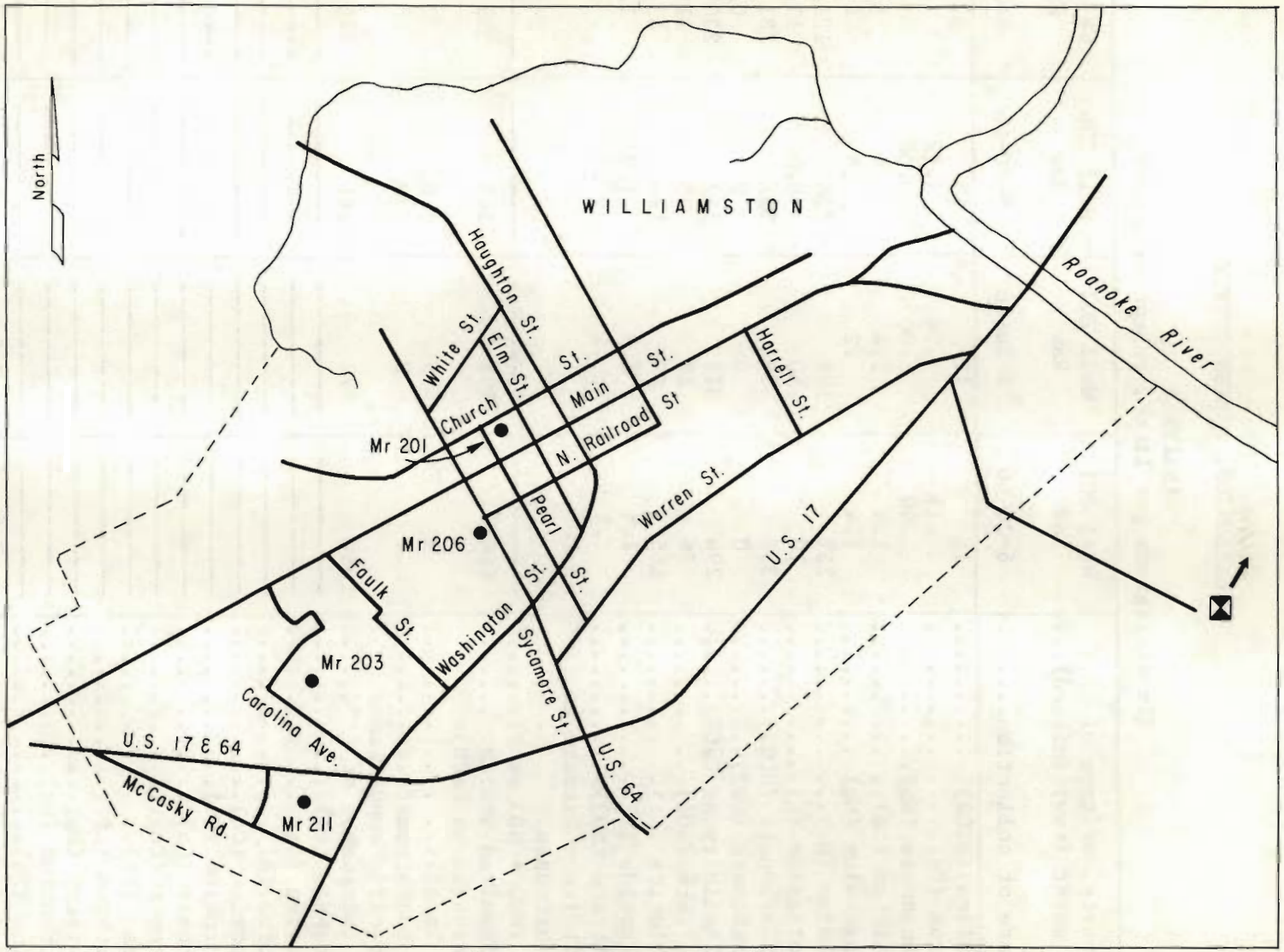
To have an additional well drilled.

WATER-RESOURCES APPRAISAL:

Surface water: Williamston is located in north-central Martin County on a low, flat upland overlooking the Roanoke River and its broad, swampy flood plain. The Roanoke River can supply any foreseeable water needs of the town.

Ground water: The town is underlain by slightly more than 800 feet of sand and clay. Only the upper 450 to 500 feet contain fresh water. The upper sandy aquifer is about 100 feet, thick and the lower sandy aquifer comprises the remainder of the deposits. Properly constructed wells in the lower sandy aquifer can yield up to 500 gal/min of fresh water. Fresh water from the lower sandy aquifer tends to be soft, moderately to highly alkaline, with moderate to excessive dissolved-solids content, and may contain excessive concentrations of fluoride and iron.

TOWN OF WILLIAMSTON



WILLIAMSTON, MARTIN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well 201 Raw	Well 203 Raw	Well 206 Raw	Well 211 Raw
Date of collection.....	6-20-66	6-20-66	6-20-66	6-20-66
Silica (SiO_2).....	15	12	15	12
Iron (Fe).....	.13	.04	.12	.23
Manganese (Mn).....	.00	.00	.00	.01
Calcium (Ca).....	1.4	1.4	1.6	5.1
Magnesium (Mg).....	1.4	.2	.5	4.7
Sodium (Na).....	251	196	224	121
Potassium (K).....	10	10	9.0	11
Bicarbonate (HCO_3).....	358	389	381	281
Carbonate (CO_3).....	0	0	0	0
Alkalinity as $CaCO_3$.....	294	319	312	230
Sulfate (SO_4).....	36	18	28	11
Chloride (Cl).....	165	64	114	43
Fluoride (F).....	1.5	1.9	1.8	1.2
Nitrate (NO_3).....	.1	.1	.1	.1
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	664	496	585	339
Hardness as $CaCO_3$:				
Total.....	9	5	6	32
Noncarbonate.....	0	0	0	0
Specific conductance (micromhos at 25°C)....	1080	772	941	545
Arsenic (As).....	----------	----------	----------	----------
Barium (Ba).....	----------	----------	----------	----------
Boron (B).....	----------	----------	----------	----------
Cadmium (Cd).....	----------	----------	----------	----------
Chromium (Cr).....	----------	----------	----------	----------
Cobalt (Co).....	----------	----------	----------	----------
Copper (Cu).....	----------	----------	----------	----------
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	----------
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	----------
Zinc (Zn).....	----------	----------	----------	----------
pH (units).....	7.6	7.6	7.6	7.6
Temperature (°C).....	----------	----------	----------	----------

WILLIAMSTON, MARTIN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished)	Wells 201, 203,206,211[a] Finished			
Date of collection	8- 5-74			
Silica (SiO_2)	----------			
Iron (Fe)	.070			
Manganese (Mn)	.020			
Calcium (Ca)	----------			
Magnesium (Mg)	----------			
Sodium (Na)	----------			
Potassium (K)	----------			
Bicarbonate (HCO_3)	----------			
Carbonate (CO_3)	----------			
Alkalinity as $CaCO_3$	----------			
Sulfate (SO_4)	----------			
Chloride (Cl)	59			
Fluoride (F)	----------			
Nitrate (NO_3)	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	----------			
Dissolved Solids	----------			
Hardness as $CaCO_3$:				
Total	----------			
Noncarbonate	----------			
Specific conductance (micromhos at 25°C)	740			
Arsenic (As)	.000			
Barium (Ba)	.000			
Boron (B)	1.900			
Cadmium (Cd)	.000			
Chromium (Cr)	.000			
Cobalt (Co)	.003			
Copper (Cu)	.002			
Lead (Pb)	----------			
Lithium (Li)	.008			
Mercury (Hg)	----------			
Strontium (Sr)	.070			
Zinc (Zn)	.008			
pH (units)	----------			
Temperature (°C)	----------			

[a] Composite sample.

NASH COUNTY

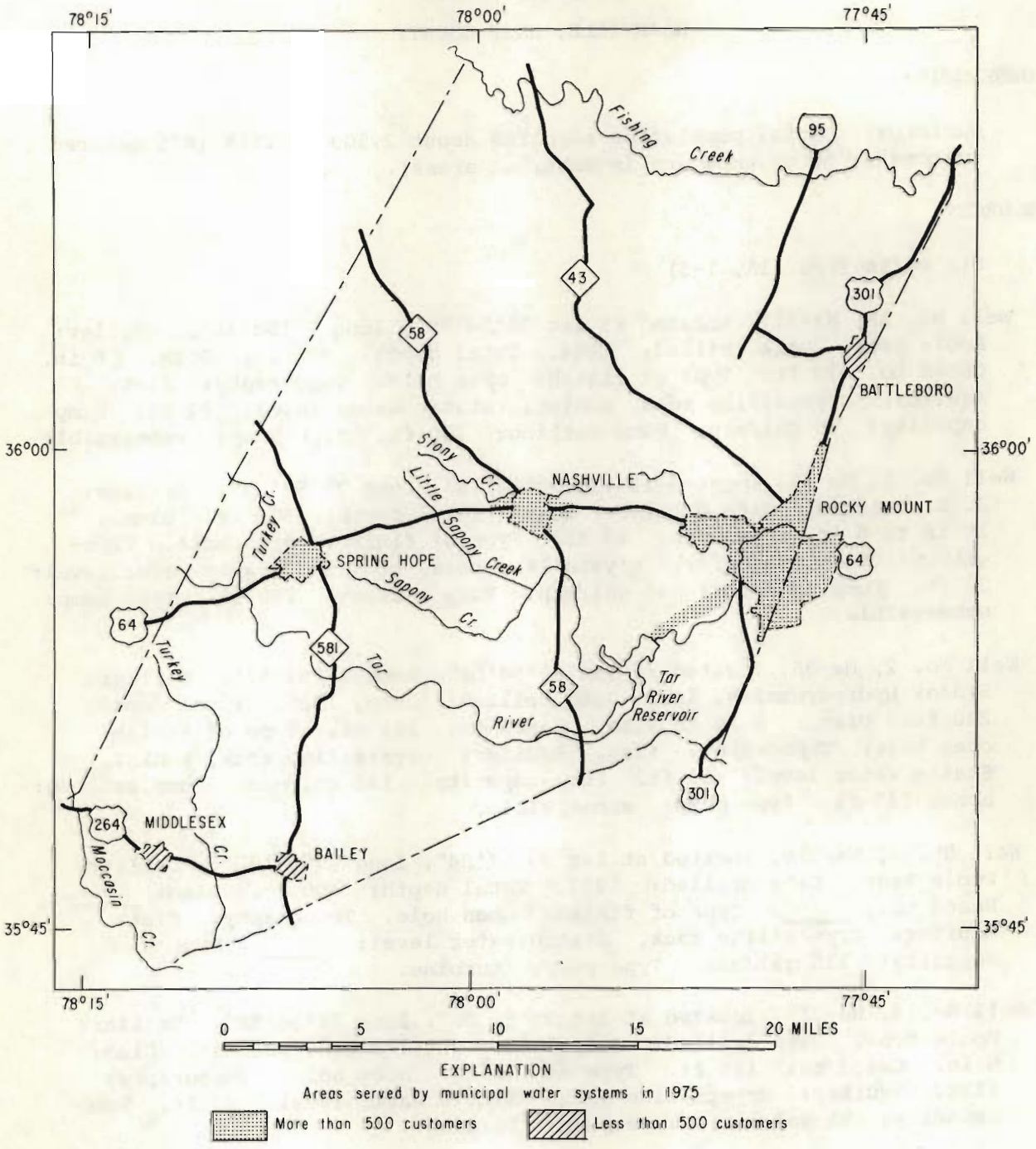
WATER-RESOURCES APPRAISAL

The eastern third of Nash County lies within the northwest part of the central Coastal Plain. The remainder of the county is in the Piedmont region. The topography is gently rolling. Drainage in the northern and central parts of the county is to the Tar River and its tributaries. In the southern part of the county, drainage is to tributaries of the Neuse River. The average discharge of streams ranges from 0.6 to 0.7 $(Mgal/d)/mi^2$. The low flows of streams range from 0 to 0.05 $(Mgal/d)/mi^2$ and average 0.012 $(Mgal/d)/mi^2$. Streams with drainage areas as large as 65 square miles go dry in drought. The 7-day, 2-year flow of streams ranges from 0.0006 to 0.14 $(Mgal/d)mi^2$. The only large impoundment in the county is at the dam on the Tar River west of Rocky Mount. The capacity of the impoundment is reported to be 4.3 billion gallons.

There are three public water supplies in the county having 500 or more customers. Two of these, Nashville and Spring Hope, are supplied from ground water. The third, Rocky Mount, has a surface-water supply. Most rural domestic and some small industrial supplies are obtained from ground water.

The county for the most part is directly underlain by a thin mantle of either weathered crystalline rock or alternating beds of clay, shell marl, or sand of the upper sandy aquifer. The underlying crystalline bedrock is composed of slates, schists, volcanic rocks, and granitic rocks. The unconsolidated deposits are poorly permeable in most places and normally yield only a few gallons per minute to wells. There are, however, isolated sand or gravel pockets which are capable of moderate yields. Wells in the crystalline rocks generally yield a few tens of gallons per minute, but, under fortunate circumstances, may yield one hundred gallons per minute or more. The maximum ground-water yield is estimated at 0.7 $(Mgal/d)/mi^2$. The water from the upper sandy aquifer tends to be soft to slightly hard, with a low dissolved solids concentration, and may contain excessive iron. The water from the crystalline rocks is normally soft and has a low dissolved-solids concentration.

NASH COUNTY


78°15'
78°00'
77°45'
36°00'
35°45'
Fishing Creek
95
43
58
301
BATTLEBORO
Stony Cr.
Little Sapony Creek
NASHVILLE
ROCKY MOUNT
Turkey Cr.
SPRING HOPE
Sapony Cr.
64
581
Turkey
Tar River
Tar River Reservoir
264
MIDDLESEX
Cr.
BAILEY
Moccasin Cr.
0 5 10 15 20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
More than 500 customers
Less than 500 customers

NASHVILLE, NASH COUNTY

OWNERSHIP:

Municipal. Total population supplied about 2,500 in 1975 (875 metered customers, 50 of whom are in suburban areas).

SOURCE:

Six wells (Nos. 1A, 1-5)

Well No. 1A, Na-217, located at lat 35°58'08", long 77°58'28". Driller: Poole Bros. Date drilled: 1964. Total depth: 305 ft. Diam.: 6 in. Cased to: 78 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, schist. Static water level: 40 ft. Pump capacity: 40 gal/min. Pump setting: 250 ft. Type pump: submersible.

Well No. 1, Na-86, located at lat 35°58'11", long 77°58'27". Driller: J. K. Bridges. Date drilled: 1916. Total depth: 300 ft. Diam.: 10 in to 6 in. Cased to: 15 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, schist. Static water level: 30 ft. Pump capacity: 40 gal/min. Pump setting: 180 ft. Type pump: submersible.

Well No. 2, Na-85, located at lat 35°58'09", long 77°57'57". Driller: Sydnor Hydrodynamics, Inc. Date drilled: June, 1936. Total depth: 240 ft. Diam.: 8 in to 6 in. Cased to: 161 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, schist. Static water level: 10 ft. Pump capacity: 155 gal/min. Pump setting: about 147 ft. Type pump: submersible.

Well No. 3, Na-218, located at lat 35°57'54", long 77°57'56". Driller: Poole Bros. Date drilled: 1953. Total depth: 400 ft. Diam: _____. Based to: _____. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock. Static water level: _____. Pump capacity: 115 gal/min. Type pump: turbine.

Well No. 4, Na-219, located at lat 35°58'06", long 77°56'52". Driller: Poole Bros. Date drilled: July 1965. Total depth: 225 ft. Diam: 6 in. Cased to: 115 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock. Static water level: 20 ft. Pump capacity: 95 gal/min. Type pump: turbine.

Well No. 5, Na-220, located at lat 35°58'34", long 77°57'35". Driller: Poole Bros. Date drilled: July 1974. Total depth: 400 ft. Diam: 6 in. Cased to: 46 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock. Static water level: 18 ft. Well yield: 144 gal/min. Pump capacity: 130 gal/min. Pump setting: 210 ft. Type pump: submersible.

NASHVILLE, NASH COUNTY

RAW-WATER STORAGE:

One underground tank for wells 1 and 1A; 110,000 gallons.

TOTAL USE:

Average (1974-75), 0.175 Mgal/d, estimated; maximum daily not recorded.

INDUSTRIAL USE:

None.

TREATMENT:

Hypochlorination at each well, except wells 1 and 1A. Water from these wells is chlorinated after storage.

RATED CAPACITY OF TREATMENT PLANT:

None.

PUMPING CAPACITY:

0.83 Mgal/d.

FINISHED-WATER STORAGE:

One elevated tank, 300,000 gallons.

FUTURE PLANS:

None.

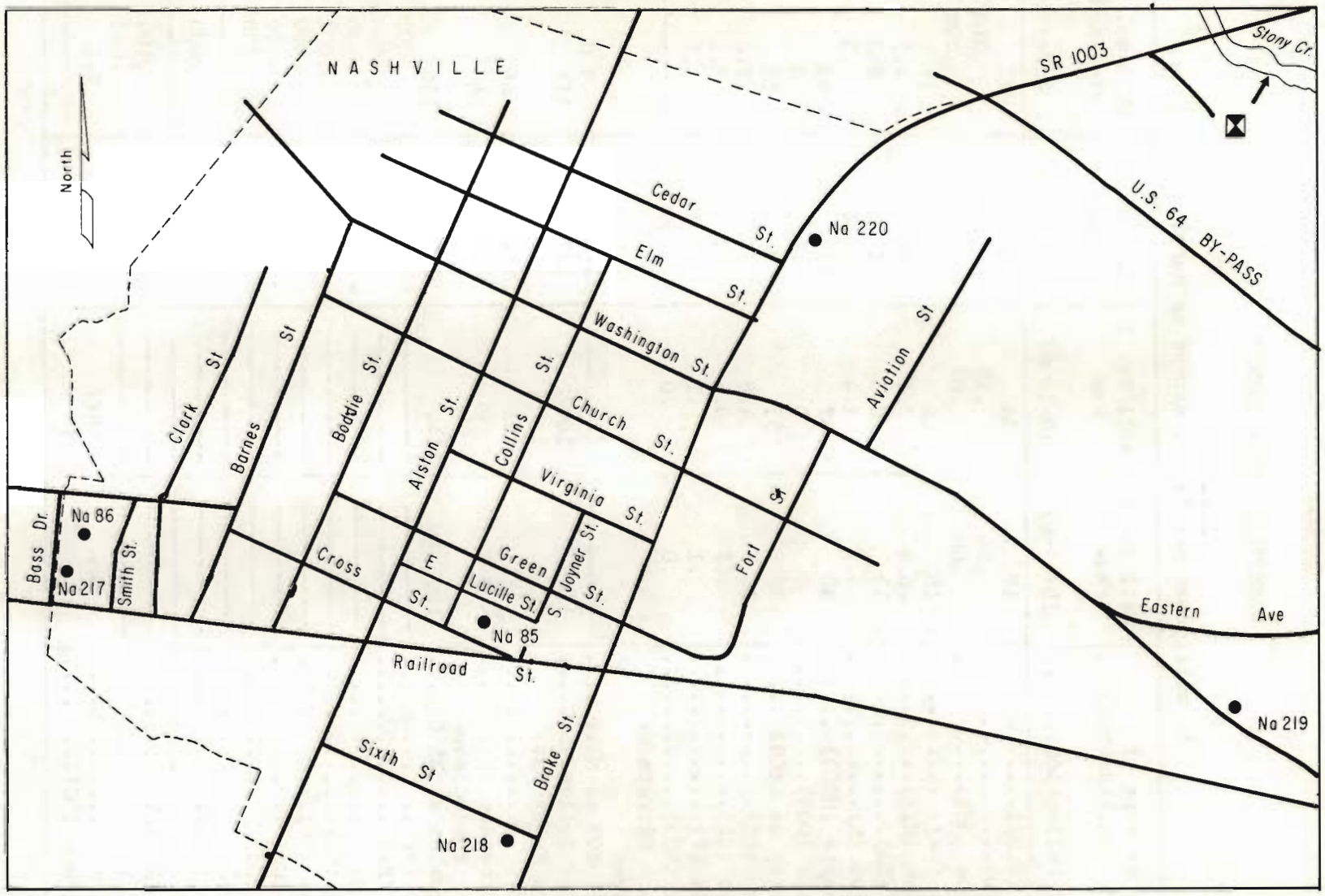
NASHVILLE, NASH COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Nashville is located in central Nash County. The town is drained by Stony and Little Sapony Creeks, tributaries of the Tar River. Most of the streams in the area go dry in drought. However, Stony Creek maintains its flow and, at a point a few miles downstream of Nashville, has an allowable draft of 0.6 Mgal/d which is more than three times present use by the town.

Ground water: The town is underlain by relatively thin and poorly permeable unconsolidated deposits of the upper sandy aquifer. These deposits are underlain by crystalline bedrock, predominantly schist, which is capable of yielding up to 300 gal/min to wells. The water from the bedrock is normally soft, with a nearly neutral pH, and a low dissolved-solids concentration. The water may contain excessive manganese.

TOWN OF NASHVILLE



NASHVILLE, NASH COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 2 Raw	Well No. 4 Raw	Well No. 5 Finished
Date of collection.....	10-17-63	10-17-63	10-17-63	4-24-75
Silica (SiO_2).....	19	34	26	22
Iron (Fe).....	.04	.19	.48	.010
Manganese (Mn).....	.00	.08	.08	.000
Calcium (Ca).....	16	16	27	19
Magnesium (Mg).....	6.6	2.6	10	4.5
Sodium (Na).....	11	8.8	14	8.7
Potassium (K).....	4.7	1.4	3.0	1.1
Bicarbonate (HCO_3).....	90	67	118	67
Carbonate (CO_3).....	0	0	0	0
Alkalinity as $CaCO_3$.....	74	55	97	55
Sulfate (SO_4).....	10	4.8	12	2.6
Chloride (Cl).....	6.7	9.6	24	7.1
Fluoride (F).....	.1	.1	.2	.1
Nitrate (NO_3).....	.0	.0	.0	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	4.0
Dissolved Solids.....	116	109	177	114
Hardness as $CaCO_3$:				
Total.....	68	51	111	66
Noncarbonate.....	0	0	14	11
Specific conductance (micromhos at 25°C)....	180	140	280	156
Arsenic (As).....	----------	----------	----------	.001
Barium (Ba).....	----------	----------	----------	.000
Boron (B).....	----------	----------	----------	.030
Cadmium (Cd).....	----------	----------	----------	.001
Chromium (Cr).....	----------	----------	----------	.000
Cobalt (Co).....	----------	----------	----------	.000
Copper (Cu).....	----------	----------	----------	.000
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	.000
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	.100
Zinc (Zn).....	----------	----------	----------	.050
pH (units).....	7.4	6.7	7.1	7.1
Temperature (°C).....	17	18	18	----------

ROCKY MOUNT, NASH COUNTY

OWNERSHIP:

Municipal. Total population supplied about 40,000 in 1974 (12,867 metered customers, 1,300 of whom are in suburban areas).

SOURCES:

Tar River impounded in Tar River Reservoir (1970): The intakes for the new water treatment plant are at the dam, 4 miles southwest of Rocky Mount at lat 35°54'00", long 77°52'58". The drainage area at the dam is 775 square miles.

Tar River: The intakes for the old water treatment plant are 120 feet north of the U.S. Route 64 bridge at lat 35°57'08", long 77"49'13". The drainage area at the intakes is 800 square miles.

RAW-WATER STORAGE:

Tar River Reservoir, 4,300 million gallons.

ALLOWABLE DRAFT:

Estimated allowable draft at the reservoir is 37.0 Mgal/d with an adjusted reservoir capacity of 3,500 million gallons.

TOTAL USE:

Average (1974), 9.98 Mgal/d, metered; maximum daily (9-4-74), 15.583 million gallons, metered.

INDUSTRIAL USE:

5.0 Mgal/d, estimated. Principal users include Burlington Industries, Unifi, Phillips Fibers, Texfi, and Abbott Laboratories.

TREATMENT:

Old treatment plant: prechlorination, coagulation with alum and lime, sedimentation, addition of carbon for control of taste and odor, rapid sand filtration, addition of phosphate compounds for corrosion control, adjustment of pH with lime and soda ash, postchlorination, and fluoridation.

New treatment plant: treatment is identical to the old plant except that caustic soda is used instead of lime.

RATED CAPACITY OF TREATMENT PLANTS:

Old treatment plant, 11 Mgal/d; new treatment plant, 12 Mgal/d.

ROCKY MOUNT, NASH COUNTY

PUMPING CAPACITIES:

Old treatment plant: raw water, 11 Mgal/d; finished water, 12 Mgal/d.

New treatment plant: raw water, 24 Mgal/d; finished water, 20 Mgal/d.

FINISHED-WATER STORAGE:

The old treatment plant has two interconnected clear wells having a total capacity of 1,500,000 gallons; the new treatment plant has one clear well of 2,500,000 gallons; there are four elevated tanks of 1,000,000; 1,000,000; 1,000,000; and 500,000 gallons.

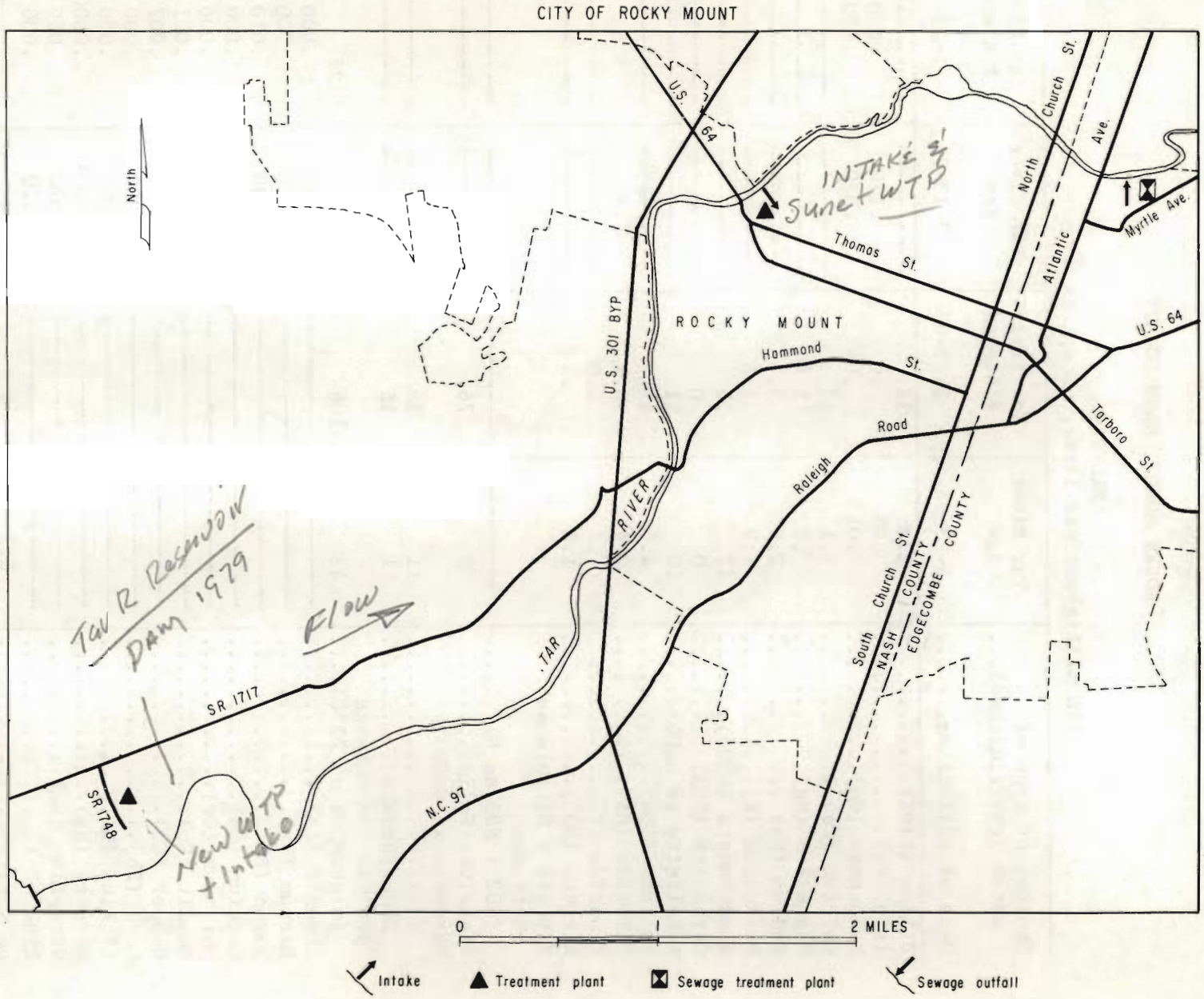
FUTURE PLANS:

The capacity of the new plant will be expanded and a 1,000,000-gallon capacity elevated tank will be built.

WATER-RESOURCES APPRAISAL:

Surface water: Rocky Mount is in east-central Nash County, with the eastern half of the city lying in Edgecombe County. With the existing dam on the Tar River, the city should be able to meet its foreseeable water needs.

Ground water: The city is underlain by alternating beds of sand, clay, and shell marl of the upper sandy aquifer. This sequence of beds has a variable thickness but probably averages about 50 feet. The crystalline rock underlying these beds is largely composed of granite. Well yields in both these aquifers tend to be less than 10 gal/min. However, it would be possible, under the most fortunate circumstances, to obtain yields of up to 100 gal/min in either aquifer. The water from these aquifers is reported as having a hardness range from soft to hard. The dissolved-solids concentration would probably be low.


CITY OF ROCKY MOUNT
North
U.S. 64
INTAKE & WTP
Sunset
North Church St.
Atlantic Ave.
Myrtle Ave.
Thomas St.
U.S. 301 BYP
ROCKY MOUNT
Hammond St.
U.S. 64
Tarboro St
Raleigh Road
RIVER
TAR
Tar R Reservoir
Dam 1979
Flow
SR 1717
SR 1748
New WTP
+ Intake
N.C. 97
South Church St
NASH COUNTY
EDGECOMBE COUNTY
0
1
2 MILES
Intake
Treatment plant
Sewage treatment plant
Sewage outfall

ROCKY MOUNT, NASH COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Tar River Raw	Tar River Finished	Tar River Raw	Tar River Finished
Date of collection.....	5-23-66	5-23-66	2-13-75	2-13-75
Silica (SiO_2).....	8.3	14	----------	----------
Iron (Fe).....	.05	.03	.170	.020
Manganese (Mn).....	.01	.04	.070	.070
Calcium (Ca).....	3.1	12	----------	----------
Magnesium (Mg).....	.6	1.4	----------	----------
Sodium (Na).....	2.6	5.3	----------	----------
Potassium (K).....	1.9	1.6	----------	----------
Bicarbonate (HCO_3).....	12	26	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	10	21	----------	----------
Sulfate (SO_4).....	4.6	18	----------	----------
Chloride (Cl).....	2.4	5.2	4.3	9.5
Fluoride (F).....	.2	1.0	----------	----------
Nitrate (NO_3).....	1.0	.1	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	35	76	----------	----------
Hardness as $CaCO_3$:				
Total.....	11	36	----------	----------
Noncarbonate.....	1	15	----------	----------
Specific conductance (micromhos at 25°C)....	43	106	59	127
Arsenic (As).....	----------	----------	.000	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.030	.010
Cadmium (Cd).....	----------	----------	.001	.000
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.002	.001
Copper (Cu).....	----------	----------	.053	.007
Lead (Pb).....	----------	----------	.000	.000
Lithium (Li).....	----------	----------	.000	.000
Mercury (Hg).....	----------	----------	.0001	.0000
Strontium (Sr).....	----------	----------	.070	.080
Zinc (Zn).....	----------	----------	.020	.030
pH (units).....	6.2	6.9	----------	----------
Temperature (°C).....	18	----------	----------	----------

ROCKY MOUNT, NASH COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished)	Tar River Reservoir Raw	Tar River Reservoir Finished		
Date of collection	2-13-75	2-13-75		
Silica (SiO_2)	12	13		
Iron (Fe)	.290	.010		
Manganese (Mn)	.080	.070		
Calcium (Ca)	4.0	4.0		
Magnesium (Mg)	1.4	1.4		
Sodium (Na)	4.2	19		
Potassium (K)	1.6	2.4		
Bicarbonate (HCO_3)	13	15		
Carbonate (CO_3)	0	0		
Alkalinity as $CaCO_3$	11	12		
Sulfate (SO_4)	7.9	29		
Chloride (Cl)	4.2	8.7		
Fluoride (F)	.1	1.5		
Nitrate (NO_3)	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	.31	.32		
Dissolved Solids	44	88		
Hardness as $CaCO_3$:				
Total	16	16		
Noncarbonate	5	4		
Specific conductance (micromhos at 25°C)	57	130		
Arsenic (As)	.000	.000		
Barium (Ba)	.000	.000		
Boron (B)	.030	.010		
Cadmium (Cd)	.000	.001		
Chromium (Cr)	.000	.000		
Cobalt (Co)	.002	.002		
Copper (Cu)	.067	.004		
Lead (Pb)	.000	.001		
Lithium (Li)	.000	.000		
Mercury (Hg)	.0001	.0004		
Strontium (Sr)	.060	.060		
Zinc (Zn)	.004	.150		
pH (units)	6.4	6.9		
Temperature (°C)	----------	----------		

SPRING HOPE, NASH COUNTY

OWNERSHIP:

Municipal. Total population supplied about 1,400 in 1975 (575 metered customers, 7 of whom are in suburban areas).

SOURCE:

Four wells (Nos. 1, 2, 4, 5).

Well No. 1, Na 128, located at lat 35°57'04", long 78°06'40". Driller: Virginia Machine and Drilling Co. Date drilled: 1921. Total depth: 507 ft. Diam: 6 in. Cased to: 237 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, schist. Static water level: _____. Pump capacity: 65 gal/min. Type pump: turbine.

Well No. 2, Na 129, located at lat 35°56'33", long 78°06'40". Driller: C. W. Norton. Date drilled: 1930. Total depth: 135 ft. Diam: 10 in. Cased to: 90 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, schist. Static water level: 20 ft. Pump capacity: 60 gal/min. Type pump: turbine.

Well No. 4, Na 221, located at lat 35°56'35", long 78°07'02". Driller: Poole Bros. Date drilled: 1963. Total depth: 305 ft. Cased to: about 90 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock. Static water level: 22 ft. Pump capacity: 120 gal/min. Pump setting: about 280 ft. Type pump: turbine.

Well No. 5, Na 222, located at lat 35°56'42", long 78°06'50". Driller: Bainbridge and Dance. Date drilled: October 1974. Total depth: 225 ft. Diam: 6 in. Cased to: 87 ft. Type of finish: open hole. Topography: flat. Aquifer: crystalline rock, slate and granite. Static water level: 20 ft. Well yield: 190 gal/min. Pump capacity: 190 gal/min. Pump setting: about 160 ft. Type pump: turbine.

TOTAL USE:

Average (1974-75) 0.08 Mgal/d, estimated; maximum daily not recorded.

INDUSTRIAL USE:

0.005 Mgal/d, metered. Principal users include Wilson Aerosol, Wakefield Homes, Inc., and K and R Sportswear.

TREATMENT:

None.

SPRING HOPE, NASH COUNTY

RATED CAPACITY OF TREATMENT PLANT:

None

PUMPING CAPACITY:

0.63 Mgal/d.

FINISHED-WATER STORAGE:

Two elevated tanks, 200,000 and 100,000 gallons.

FUTURE PLANS:

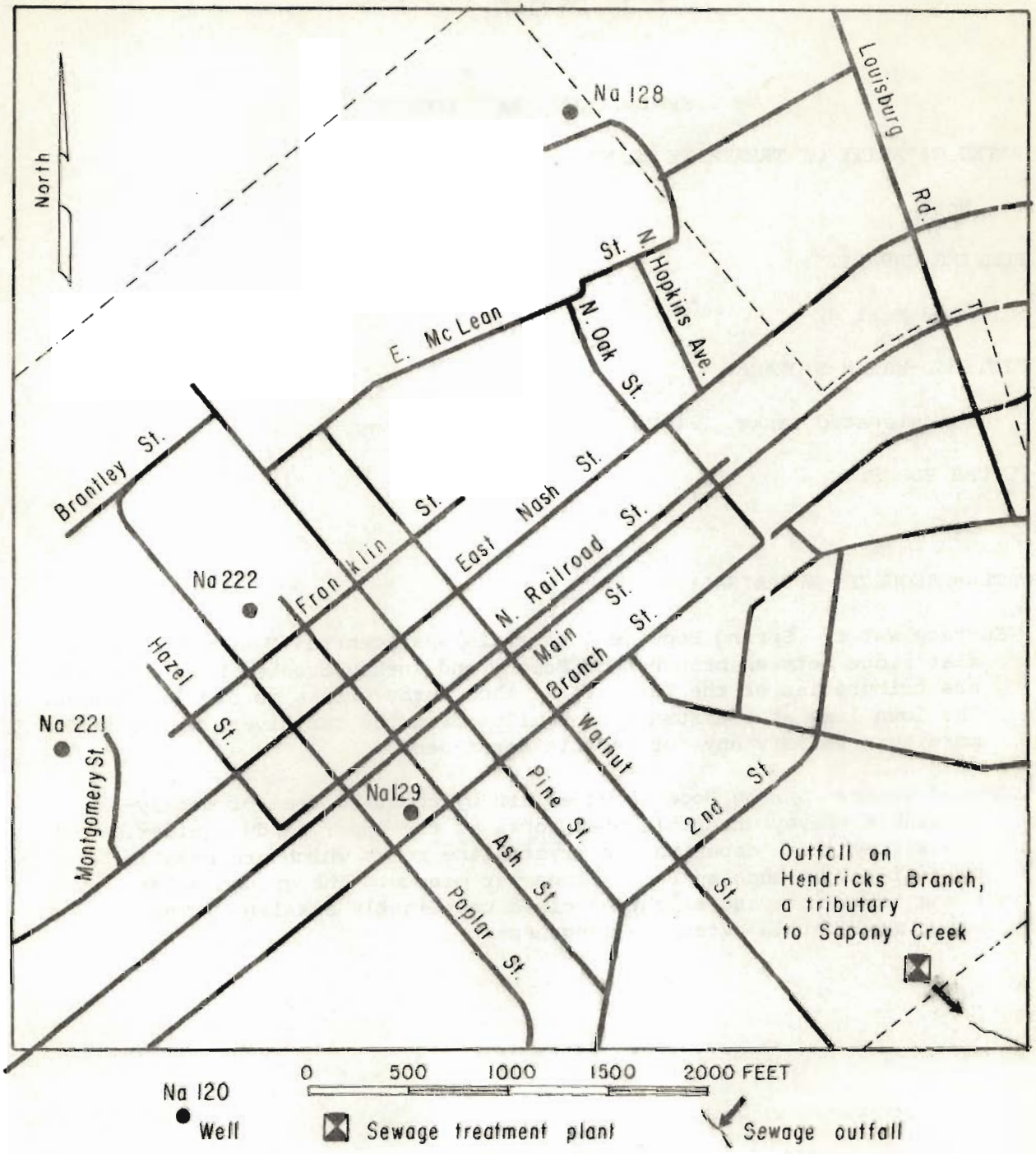
None.

WATER-RESOURCES APPRAISAL:

Surface water: Spring Hope is located in west-central Nash County on a flat ridge between branches of Sapony and Turkey Creeks, both of which are tributaries of the Tar River. The nearby creeks go dry in drought. The town lies at a distance of 2 miles from the Tar River, which could more than satisfy any foreseeable water need.

Ground water: Spring Hope is underlain by about 50 feet of poorly-permeable clayey unconsolidated rocks of the upper sandy aquifer. Underlying these deposits are crystalline rocks which are capable of yielding as much as 200 gallons per minute. The ground water tends to be soft and slightly acidic to slightly alkaline. The water may contain excessive manganese.

TOWN OF SPRING HOPE



SPRING HOPE, NASH COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 4	Well No. 5		
Date of collection.....	5-15-64	4-24-75		
Silica (SiO2).....	27	29		
Iron (Fe).....	.17	.090		
Manganese (Mn).....	.08	.110		
Calcium (Ca).....	13	21		
Magnesium (Mg).....	2.5	5.5		
Sodium (Na).....	7.7	10		
Potassium (K).....	1.6	1.5		
Bicarbonate (HCO3).....	61	100		
Carbonate (CO3).....	0	0		
Alkalinity as CaCO3.....	50	82		
Sulfate (SO4).....	1.0	2.5		
Chloride (Cl).....	5.7	5.6		
Fluoride (F).....	.1	.1		
Nitrate (NO3).....	1.2	----------		
Nitrite + Nitrate as Nitrogen (NO2 + NO3 as N).....	----------	.85		
Dissolved Solids.....	90	124		
Hardness as CaCO3:				
Total.....	42	75		
Noncarbonate.....	0	0		
Specific conductance (micromhos at 25°C)....	115	177		
Arsenic (As).....	----------	.001		
Barium (Ba).....	----------	.050		
Boron (B).....	----------	.020		
Cadmium (Cd).....	----------	.001		
Chromium (Cr).....	----------	.000		
Cobalt (Co).....	----------	.000		
Copper (Cu).....	----------	.001		
Lead (Pb).....	----------	----------		
Lithium (Li).....	----------	.000		
Mercury (Hg).....	----------	----------		
Strontium (Sr).....	----------	.090		
Zinc (Zn).....	----------	.040		
pH (units).....	6.6	6.7		
Temperature (°C).....	16	----------		

NORTHAMPTON COUNTY

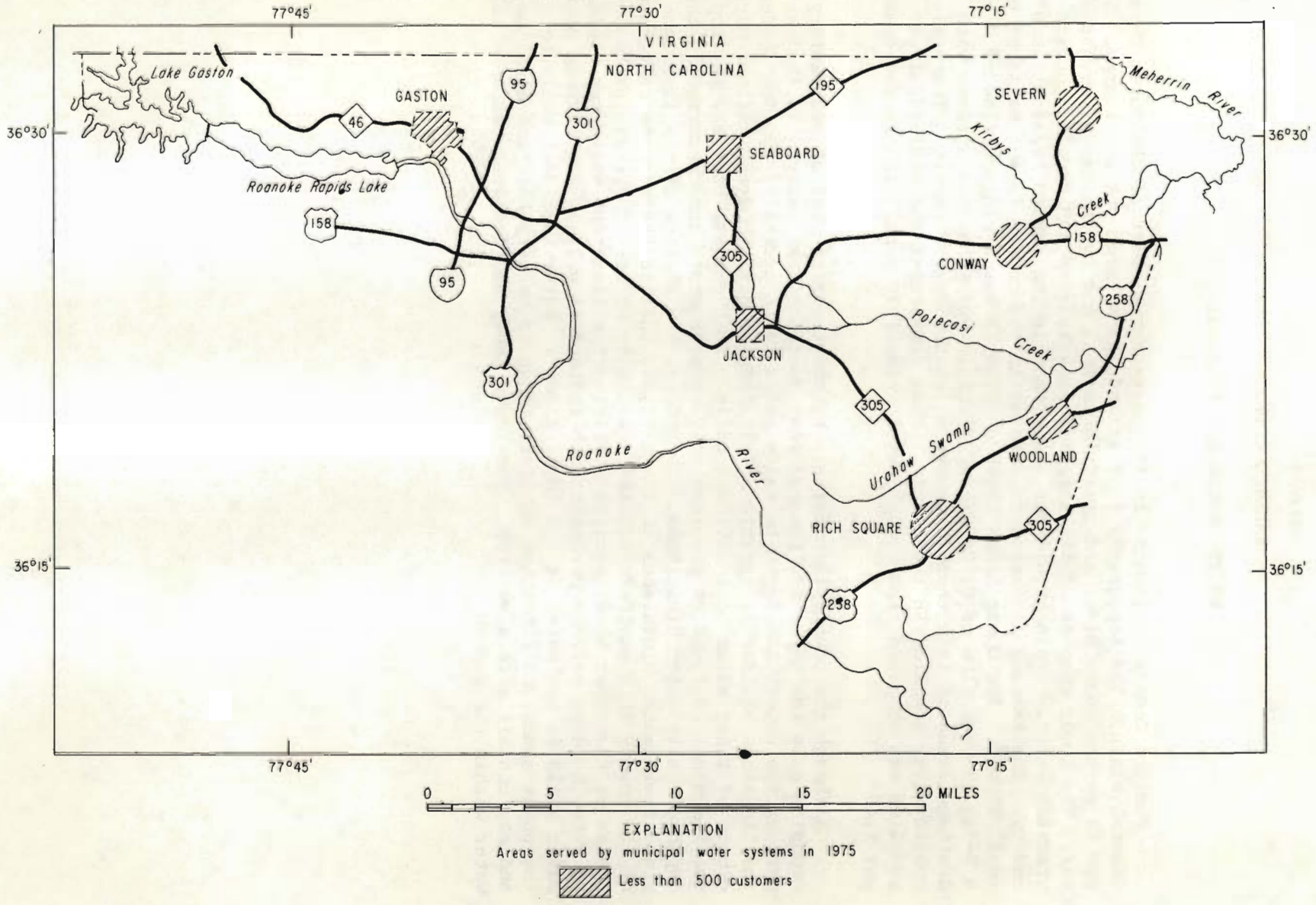
WATER-RESOURCES APPRAISAL

Northampton County lies in the northwestern part of the North Carolina Coastal Plain. The topography is flat in the eastern part of the county and gently rolling in the western part. The county is drained by the Roanoke River and its tributaries, and by tributaries of the Chowan River, notably the Meherrin River. The average discharge of unregulated streams in the county ranges from 0.6 (Mgal/d)/mi^2 in the western part of the county to 0.7 (Mgal/d)/mi^2 in the eastern part of the county and averages 0.6 (Mgal/d)/mi^2. Minimum flows range from 0 to 0.066 (Mgal/d)/mi^2 and averages 0.024 (Mgal/d)/mi^2. Streams with drainage areas as large as 63 square miles go dry in drought. The 7-day, 2-year stream discharge ranges from 0.0014 to 0.15 (Mgal/d)/mi^2 and averages 0.063 (Mgal/d)/mi^2. The Roanoke River is highly regulated by the John H. Kerr and Roanoke Rapids dam impoundments. The minimum daily release from the lower dam, at Roanoke Rapids, is 646 million gallons. The Meherrin River has no significant impoundments.

There are no public water supplies in the county having 500 or more customers. The numerous small public supplies, and individual and commercial supplies are obtained almost entirely from ground water. There are a few withdrawals from the rivers by industries. The county population in 1970 was 24,009.

Where present, the upper sandy aquifer averages less than 100 feet in thickness. The lower sandy aquifer is only found in the eastern half of the county where it reaches a maximum thickness of over 400 feet. In the extreme western part of the county there are places where these deposits are entirely missing and the crystalline rock, which normally underlies them, is found at the surface. Where the lower sandy aquifer is thickest, well yields up to 1,000 gal/min can probably be obtained. Wells in the upper sandy aquifer yield far less. Yields of wells in the crystalline rocks tend to be highly variable, ranging from virtually zero to several tens of gallons per minute. The maximum available ground water is estimated at 0.73 (Mgal/d)/mi^2. However, the maximum possible recharge to the lower sandy aquifer is estimated at 0.007 to 0.03 (Mgal/d)/mi^2, with the larger value more likely in the eastern part of the county. The water from wells is normally soft and has a low dissolved-solids concentration. Excessive iron concentrations are not uncommon, especially in shallow wells.

NORTHAMPTON COUNTY

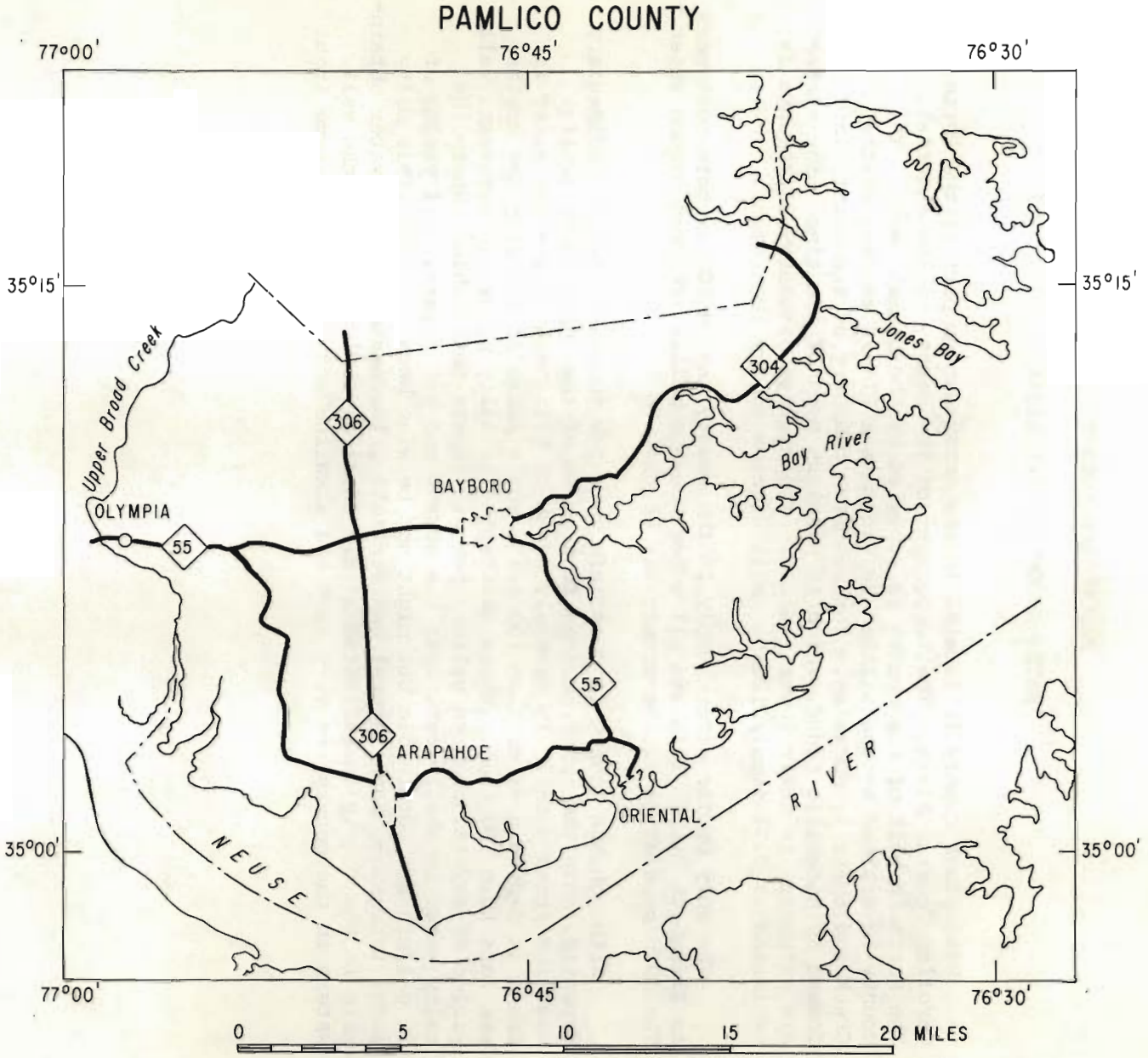


PAMLICO COUNTY

WATER-RESOURCES APPRAISAL

Pamlico County is located in the east-central part of the North Carolina Coastal Plain. The topography is flat and, to a large extent, swampy. Drainage is by the Neuse River and its tributaries, and by the Bay River and Jones Bay. The lower reaches of the streams are estuarine and usually contain brackish water. Drainage ditches are common in the agricultural areas of the county. The average discharge of streams in the county is estimated at 0.78 $(Mgal/d)/mi^2$. The Upper Broad Creek at Olympia has a minimum flow of 0 and a 7-day, 2-year flow of 0.0045 $(Mgal/d)/mi^2$. Non-estuarine streams with drainage areas of less than 25 square miles frequently go dry. There are no public water supplies in the county. Most commercial and individual water supplies are obtained from ground water. The 1970 population in the county was 9,467.

Although the county is underlain by thousands of feet of sedimentary deposits only the upper few hundred feet contain fresh water. In the western part of the county the depth to salty water is in excess of 400 feet. Here, the limestone aquifer is capable of yielding several thousand gallons per minute of fresh water to individual wells. To the east, however, the top of the limestone is found at progressively greater depth and concurrently the depth of salty water diminishes. Therefore, the ability of the limestone to yield fresh water diminishes to the east, so that in the extreme eastern part of the county this aquifer contains only salty water. There are sands and shales of the upper sandy aquifer overlying the limestone which can yield up to a few hundred gallons per minute to individual wells. The maximum groundwater yield is estimated at 1.0 $(Mgal/d)/mi^2$. Water from deep wells both in the upper sandy and limestone aquifers tends to be very hard and alkaline, and may contain excessive iron. The lower sandy aquifer contains only salt water within the county.


PAMLICO COUNTY
77°00'
76°45'
76°30'
35°15'
35°00'
Upper Broad Creek
Jones Bay
Bay River
304
306
BAYBORO
OLYMPIA
55
55
306
ARAPAHOE
ORIENTAL
NEUSE
RIVER
0
5
10
15
20 MILES

PASQUOTANK COUNTY

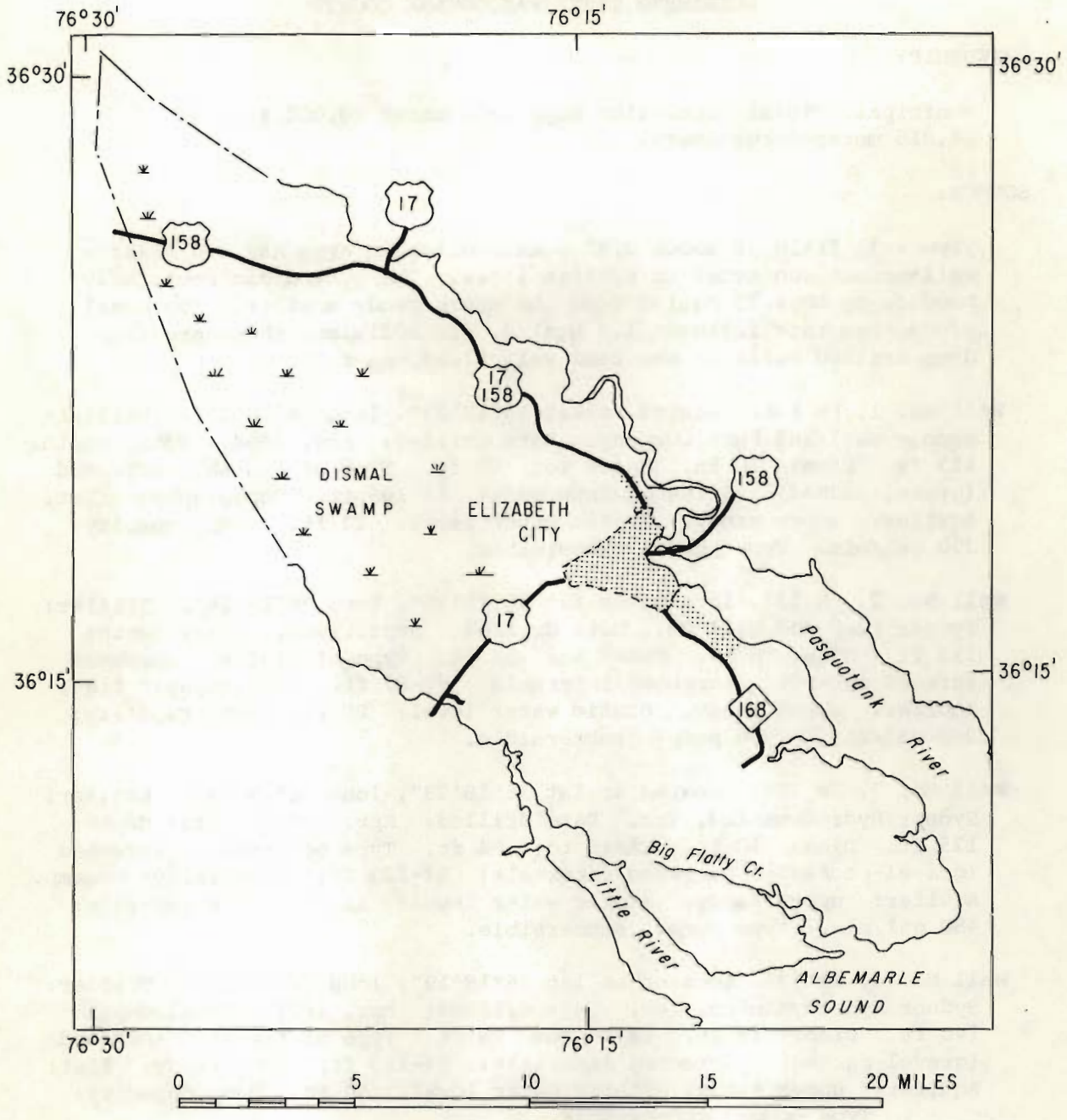
WATER-RESOURCES APPRAISAL

Pasquotank County is located in the northeastern part of the North Carolina Coastal Plain. The topography of the county is low and flat. The northern half of the county is occupied by the Dismal Swamp. The county is drained by the Little and Pasquotank Rivers and Big Flatty Creek and their tributaries. The southern boundary of the county is formed by Albemarle Sound, which is brackish most of the time. The streams are estuarine in their lower reaches. The average discharge of streams is estimated at 0.71 (Mgal/d)/mi^2. Most streams go dry in drought.

The only public water supply in the county having 500 or more customers is Elizabeth City. This and all other known supplies are from ground water. The 1970 population of the county was 26,824.

Although the county is underlain by a few thousand feet of sedimentary deposits, only the upper hundred feet or so of the upper sandy aquifer contains fresh water. In general, north of Elizabeth City salty water is found at depths greater than 100 feet, while south of the city the depths are less than 100 feet. Where the depths to salty water are greatest, well yields of several hundred gallons per minute are obtainable. Where the salty water is shallowest, near the sounds and estuarines, well yields of 50 gal/min are obtainable but might not be wise because of possible salty water intrusion, both lateral and vertical. The maximum ground water obtainable in the county is estimated at 1.0 (Mgal/d)/mi^2. Commonly, the well waters in the county are very hard and alkaline and contain excessive iron.

PASQUOTANK COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

ELIZABETH CITY, PASQUOTANK COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 20,000 in 1974 (4,815 metered customers).

SOURCE:

Town well field of about 0.48 square miles in area has 230 shallow well-points connected to suction lines. The system can reportedly produce up to 1.75 Mgal/d from the upper sandy aquifer. The usual production rate is about 1.0 Mgal/d. In addition, there are four deep drilled wells in the same well field, as follows:

Well No. 1, Pk 136, located at lat 36°18'22", long 76°16'21". Driller: Sydnor Well and Pump Company. Date drilled: Aug. 1964. Total depth: 117 ft. Diam: 10 in. Cased to: 65 ft. Type of finish: screened (gravel-packed). Screened intervals: 65-105 ft. Topography: flat. Aquifer: upper sandy. Static water level: 22 ft. Pump capacity: 390 gal/min. Type pump: submersible.

Well No. 2, Pk 137, located at lat 36°18'29", long 76°16'16". Driller: Sydnor Pump and Well Co. Date drilled: Sept. 1966. Total depth: 113 ft. Diam: 8 in. Cased to: 57 ft. Type of finish: screened (gravel-packed). Screened intervals: 57-87 ft. Topography: flat. Aquifer: upper sandy. Static water level: 28 ft. Pump capacity: 200 gal/min. Type pump: submersible.

Well No. 3, Pk 138, located at lat 36°18'23", long 76°17'23". Driller: Sydnor Hydrodynamics, Inc. Date drilled: Apr. 1967. Total depth: 125 ft. Diam: 10 in. Cased to: 94 ft. Type of finish: screened (gravel-packed). Screened intervals: 94-120 ft. Topography: swamp. Aquifer: upper sandy. Static water level: 11 ft. Pump capacity: 480 gal/min. Type pump: submersible.

Well No. 4, Pk 139, located at lat 36°18'19", long 76°16'31". Driller: Sydnor Hydrodynamics, Inc. Date drilled: Apr. 1971. Total depth: 140 ft. Diam: 14 in. Cased to: 94 ft. Type of finish: screened (gravel-packed). Screened intervals: 94-120 ft. Topography: flat. Aquifer: upper sandy. Static water level: 30 ft. Pump capacity: _____. Type pump: submersible.

TOTAL USE:

Average (Jul. 1973 - Jun. 1974), 2.12 Mgal/d, metered; maximum daily (6-22-74), 2.63 million gallons, metered.

ELIZABETH CITY, PASQUOTANK COUNTY

INDUSTRIAL USE:

0.8 Mgal/d, estimated. Principal users include Pepsi-Cola Bottling Co. and Coca-Cola Bottling Co.

TREATMENT:

Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, addition of phosphate compounds for corrosion control, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

2.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 4 Mgal/d; finished water, 2.6 Mgal/d.

RAW-WATER STORAGE:

Two ground storage tanks, 30,000 and 3.0 million gallons.

FINISHED-WATER STORAGE:

Two elevated tanks, 500,000 gallons each; one ground storage tank, 1.0 million gallons.

FUTURE PLANS:

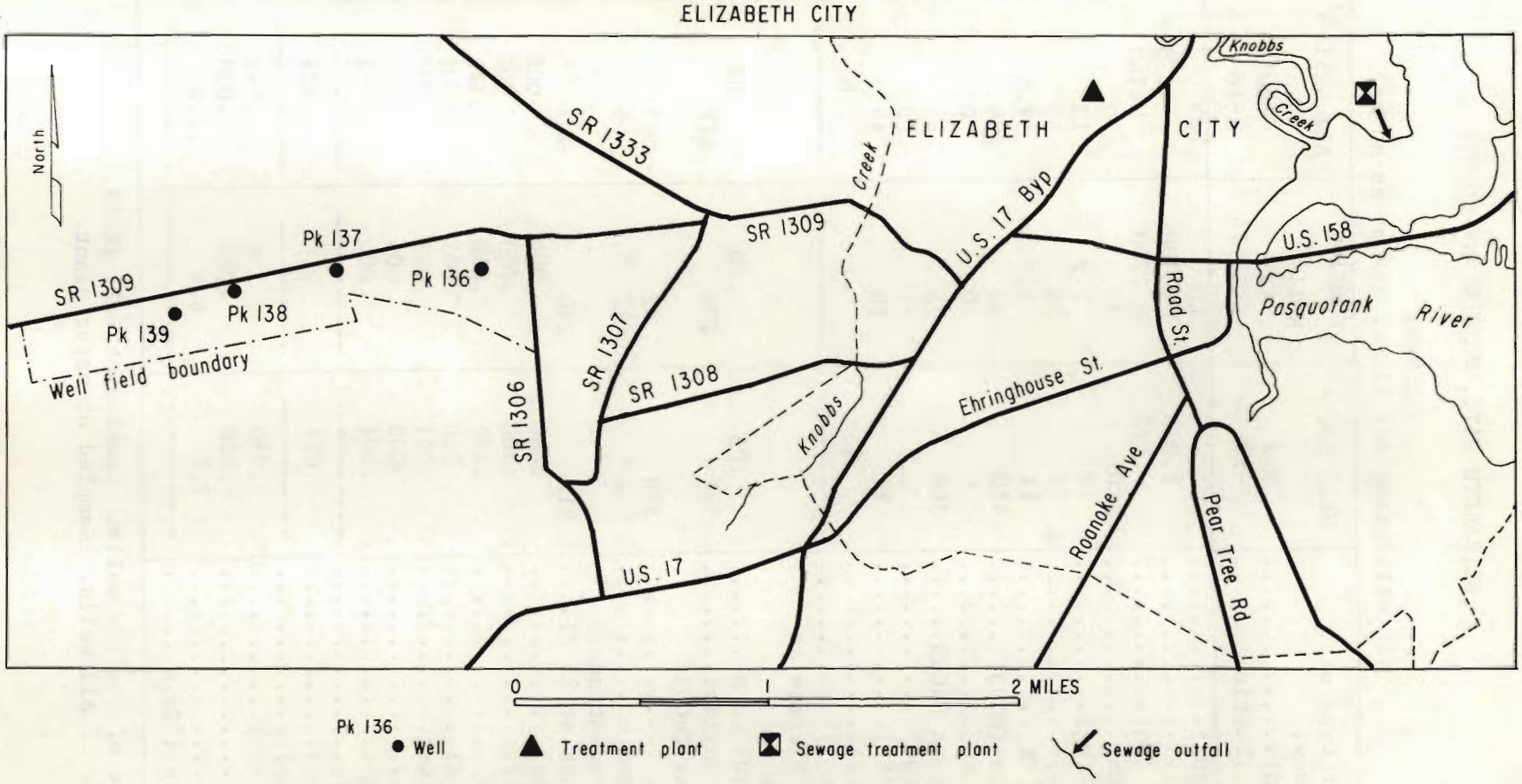
Expansion of existing plant to 5.0 Mgal/d (ultimate capacity, 10 Mgal/d). The additional raw water will be obtained from new wells of shallow and intermediate depth.

ELIZABETH CITY, PASQUOTANK COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Elizabeth City is located on a flat area between the southeast end of the Dismal Swamp and the estuary of the Pasquotank River. The city formerly obtained its water supply from Knobbs Creek, an estuarine tributary of the Pasquotank River. This supply was abandoned because of recurrent excessive chloride concentrations. The average discharge for streams is estimated at 0.71 $(Mgal/d)/mi^2$. Most non-estuarine streams in the area go dry in drought.

Ground water: Approximately the upper 75 to 150 feet of the upper sandy aquifer in the vicinity contain fresh water. Well yields of several hundred gallons per minute of fresh water have been obtained from this aquifer. The ground water tends to be hard and with an excessive iron concentration.


ELIZABETH CITY
North
SR 1333
ELIZABETH
CITY
Creek
Knobbs
Creek
U.S. 17 Byp
SR 1309
U.S. 158
Pk 137
Pk 136
SR 1309
Pk 139
Pk 138
Well field boundary
SR 1307
SR 1306
SR 1308
Road St.
Posquotank
River
Ehringhouse St.
Knobbs
Roanoke Ave
Pear Tree Rd
U.S. 17
0
1
2 MILES
Pk 136
Well
Treatment plant
Sewage treatment plant
Sewage outfall

ELIZABETH CITY, PASQUOTANK COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished)	Well No. 4	Shallow Wells[a]	All Wells[b]	All Wells[b]
	Raw	Raw	Raw	Finished
Date of collection	7-18-74	7-18-74	7-18-74	7-18-74
Silica (SiO_2)	52	40	47	39
Iron (Fe)	2.800	1.700	.020	.010
Manganese (Mn)	.170	.200	.160	.003
Calcium (Ca)	100	27	73	23
Magnesium (Mg)	18	5.9	13	11
Sodium (Na)	77	14	50	48
Potassium (K)	11	1.9	7.0	7.0
Bicarbonate (HCO_3)	450	92	296	85
Carbonate (CO_3)	0	0	0	----------
Alkalinity as $CaCO_3$	369	75	243	----------
Sulfate (SO_4)	2.9	31	20	37
Chloride (Cl)	99	10	59	68
Fluoride (F)	.6	.7	.6	1.5
Nitrate (NO_3)	----------	----------	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	.03	.00	.04	.05
Dissolved Solids	586	178	417	277
Hardness as $CaCO_3$:				
Total	320	92	240	100
Noncarbonate	0	17	0	33
Specific conductance (micromhos at 25°C)	912	240	640	432
Arsenic (As)	.000	.000	.000	.001
Barium (Ba)	.000	.000	.000	.000
Boron (B)	.170	.040	.110	.090
Cadmium (Cd)	.000	.001	.001	.002
Chromium (Cr)	.001	.002	.001	.000
Cobalt (Co)	.000	.003	.002	.000
Copper (Cu)	.002	.000	.001	.000
Lead (Pb)	----------	----------	----------	----------
Lithium (Li)	.021	.014	.021	.021
Mercury (Hg)	----------	----------	----------	----------
Strontium (Sr)	.730	.250	.590	.200
Zinc (Zn)	.020	.080	.030	.005
pH (units)	7.2	6.4	7.2	9.2
Temperature (°C)	----------	----------	----------	----------

a/Composite of shallow wells. Sampled at well field.
b/Composite of all wells. Sampled at water plant.

PERQUIMANS COUNTY

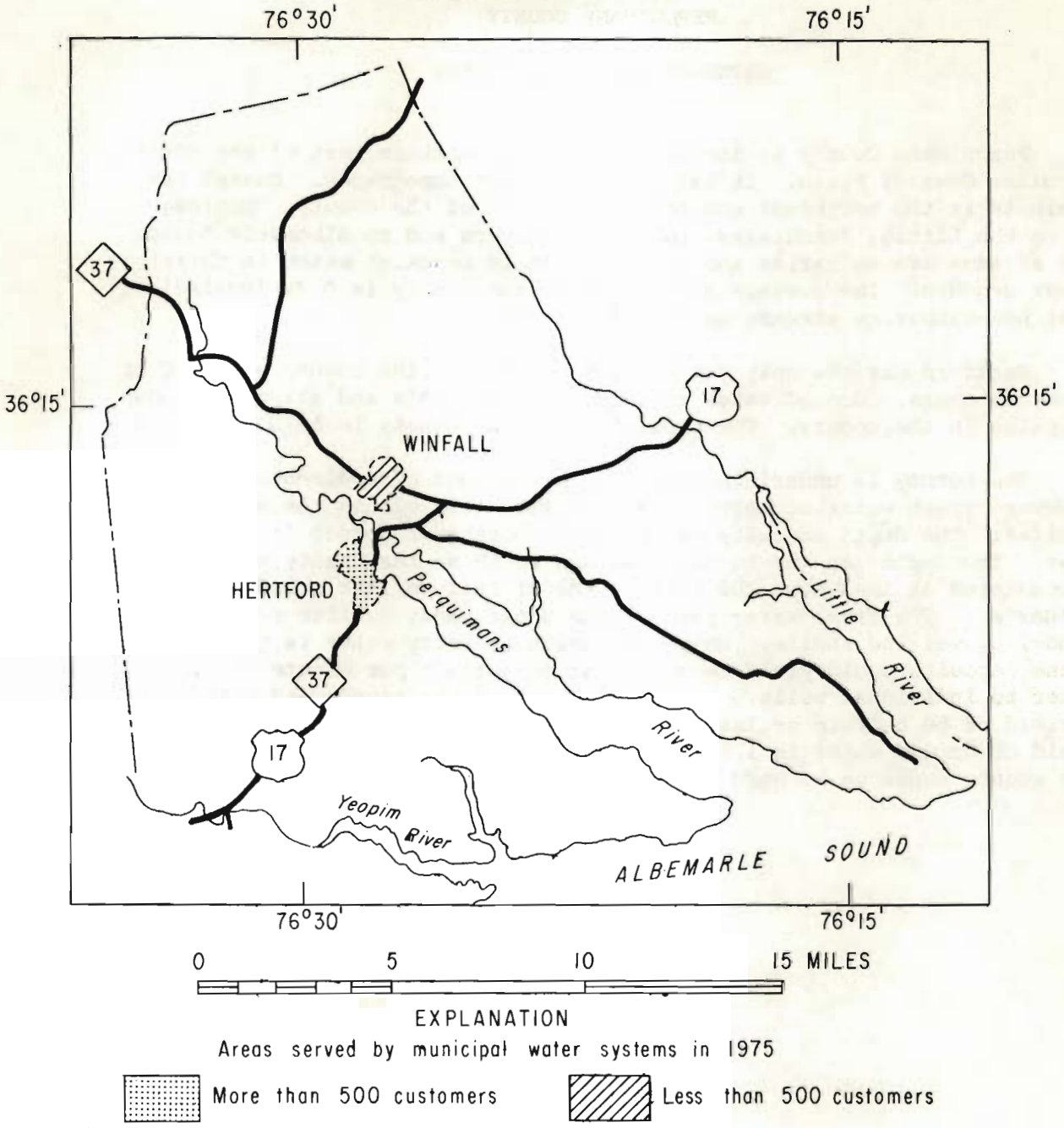
WATER-RESOURCES APPRAISAL

Perquimans County is located in the northeastern part of the North Carolina Coastal Plain. It has a low and flat topography. Swamps predominate in the northeast and southwest parts of the county. Drainage is to the Little, Perquimans, and Yeopim Rivers and to Albemarle Sound. The streams are estuarine and usually contain brackish water in their lower reaches. The average streamflow in the county is 0.71 $(Mgal/d)/mi^2$. Most non-estuarine streams go dry in drought.

Hertford has the only public water supply in the county with 500 or more customers. Ground water is the source for this and all other known supplies in the county. The population of the county in 1970 was 8,351.

The county is underlain by thousands of feet of sedimentary deposits. However, fresh water occupies only a shallow zone within the upper sandy aquifer. The depth to salty water in the northwest corner is about 300 feet. The depth lessens to the east and south so that salty water is encountered at less than 100 feet in the vicinity of the sound and estuaries. The fresh-water part of the upper sandy aquifer consists of sands, clays, and shells. Where the depth to salty water is greatest, these deposits could yield several hundred gallons per minute of fresh water to individual wells. In the vicinity of the sounds and estuaries a yield of 50 gal/min or less can be expected. The estimated maximum yield of ground water is 1.0 $(Mgal/d)/mi^2$. The fresh ground water in the county tends to be hard and to contain excessive iron.

PERQUIMANS COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

Less than 500 customers

HERTFORD, PERQUIMANS COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 2,000 in 1974 (about 850 customers).

SOURCE:

Two wells (Nos. 1 and 2).

Well No. 1, Pr 19, located at lat 36°10'58", long 76°28'50". Driller: Heater Well Co. Date Drilled: Sept. 1958. Total depth: 130 ft. Diam: 10 in to 8 in. Cased to: 57 ft. Type of finish: screened. Screened intervals: 57-62 ft, 72-77 ft, 84-89 ft, 102-107 ft, 117-122 ft. Topography: flat. Aquifer: upper sandy. Static water level: 15 ft. Pump capacity: 385 gal/min. Type pump: turbine.

Well No. 2, Pr 64, located at lat 36°10'48", long 76°29'00". Driller: _____. Date drilled: 1962. Total depth: 110 ft. Diam: 10 in. Cased to: _____. Type of finish: _____. Topography: flat. Aquifer: upper sandy. Static water level: _____. Pump capacity: 120 gal/min. Type pump: turbine.

TOTAL USE:

Average (July 1973 - June 1974), 0.216 Mgal/d. Maximum daily use estimated at 0.3 Mgal/d.

INDUSTRIAL USE:

0.005 Mgal/d, estimated. Principal users include Don Juan Manufacturing Company and Sand E. Fashions, Incorporated.

TREATMENT:

Prechlorination, coagulation with lime, sedimentation.

RATED CAPACITY OF TREATMENT PLANT:

0.5 Mgal/d.

PUMPING CAPACITY:

Raw water, 0.7 Mgal/d; finished water, 0.7 Mgal/d.

RAW-WATER STORAGE:

None

HERTFORD, PERQUIMANS COUNTY

FINISHED-WATER STORAGE:

Two elevated tanks, 500,000 and 100,000 gallons; one ground storage tank, 150,000 gallons.

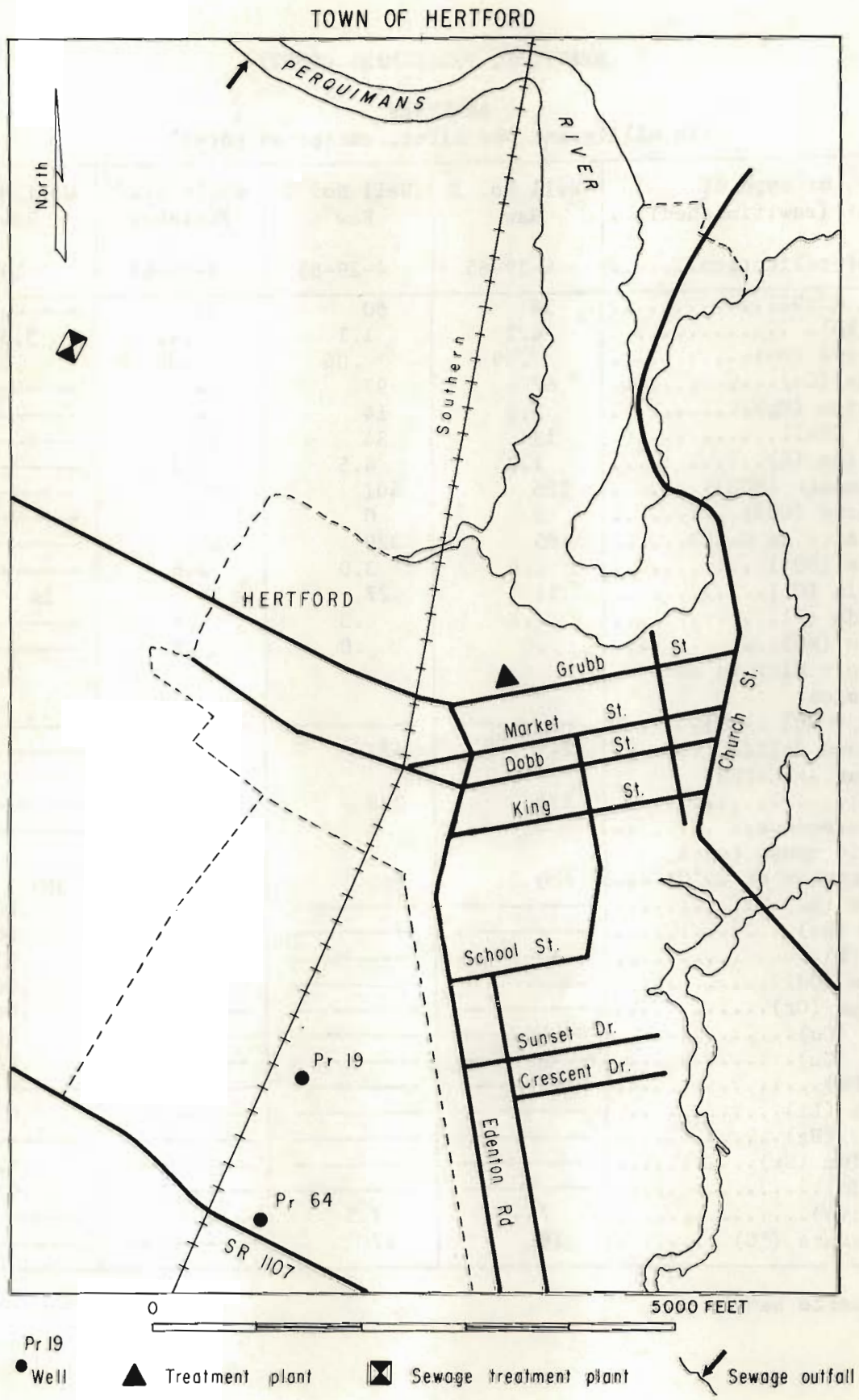
FUTURE PLANS:

Plan to extend a 6-inch main about 1,200 ft to serve 34 houses.

WATER-RESOURCES APPRAISAL:

Surface water: Hertford is located in central Perquimans County on the west side of the Perquimans River estuary. The estuary is not suitable for a public water supply because of frequent occurrences of high chloride concentrations. The average stream discharge is 0.71 $(Mgal/d)/mi^2$. Most streams in the area go dry in drought.

Ground water: The town is underlain by beds composed of sand, clay and shells belonging to the upper sandy aquifer. These beds contain fresh water to depths of less than 200 feet. Wells in this aquifer yield up to a few hundred gallons per minute of fresh water except in the immediate vicinity of the estuaries where salty water is encountered at the shallowest depths. The fresh ground water tends to be very hard and to contain excessive iron.


TOWN OF HERTFORD
PERQUIMANS
RIVER
North
Southern
HERTFORD
Grubb St
Market St.
Dobb St.
King St.
Church St.
School St.
Sunset Dr.
Crescent Dr.
Edenton Rd
Pr 19
Pr 64
SR 1107
0
5000 FEET
Pr 19
Well
Treatment plant
Sewage treatment plant
Sewage outfall

HERTFORD, PERQUIMANS COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 2 Raw	Wells 1,2[a/] Finished	Well No. 1 Raw
Date of collection.....	4-29-65	4-29-65	4-29-65	7-19-74
Silica (SiO_2).....	34	60	39	----------
Iron (Fe).....	4.2	1.1	.41	3.800
Manganese (Mn).....	.09	.06	.00	.110
Calcium (Ca).....	67	97	24	----------
Magnesium (Mg).....	2.8	14	4.3	----------
Sodium (Na).....	13	34	21	----------
Potassium (K).....	1.2	4.5	2.2	----------
Bicarbonate (HCO_3).....	226	401	109	----------
Carbonate (CO_3).....	0	0	0	----------
Alkalinity as $CaCO_3$.....	185	329	89	----------
Sulfate (SO_4).....	2.4	3.0	7.6	----------
Chloride (Cl).....	11	27	24	14
Fluoride (F).....	.1	.3	.1	----------
Nitrate (NO_3).....	.0	.0	.2	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	243	437	177	----------
Hardness as $CaCO_3$:				
Total.....	178	298	78	----------
Noncarbonate.....	0	0	0	----------
Specific conductance (micromhos at 25°C)....	400	690	242	385
Arsenic (As).....	----------	----------	----------	.000
Barium (Ba).....	----------	----------	----------	.000
Boron (B).....	----------	----------	----------	.010
Cadmium (Cd).....	----------	----------	----------	.001
Chromium (Cr).....	----------	----------	----------	.001
Cobalt (Co).....	----------	----------	----------	.002
Copper (Cu).....	----------	----------	----------	.001
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	.007
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	.420
Zinc (Zn).....	----------	----------	----------	.020
pH (units).....	7.4	7.5	8.0	----------
Temperature (°C).....	16	17	----------	----------

[a/] Composite sample.

HERTFORD, PERQUIMANS COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 2 Raw	Wells 1,2[a] Finished		
Date of collection.....	7-19-74	7-19-74		
Silica (SiO_2).....	----------	----------		
Iron (Fe).....	.890	.180		
Manganese (Mn).....	.062	.033		
Calcium (Ca).....	----------	----------		
Magnesium (Mg).....	----------	----------		
Sodium (Na).....	----------	----------		
Potassium (K).....	----------	----------		
Bicarbonate (HCO_3).....	----------	----------		
Carbonate (CO_3).....	----------	----------		
Alkalinity as $CaCO_3$.....	----------	----------		
Sulfate (SO_4).....	----------	----------		
Chloride (Cl).....	28	21		
Fluoride (F).....	----------	----------		
Nitrate (NO_3).....	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------		
Dissolved Solids.....	----------	----------		
Hardness as $CaCO_3$:				
Total.....	----------	----------		
Noncarbonate.....	----------	----------		
Specific conductance (micromhos at 25°C)....	649	197		
Arsenic (As).....	.000	.000		
Barium (Ba).....	.000	.000		
Boron (B).....	.060	.020		
Cadmium (Cd).....	.001	.001		
Chromium (Cr).....	.001	.000		
Cobalt (Co).....	.001	.000		
Copper (Cu).....	.000	.002		
Lead (Pb).....	----------	----------		
Lithium (Li).....	.021	.007		
Mercury (Hg).....	----------	----------		
Strontium (Sr).....	.770	.250		
Zinc (Zn).....	.020	.000		
pH (units).....	----------	----------		
Temperature (°C).....	----------	----------		

[a] Composite sample.

PITT COUNTY

WATER-RESOURCES APPRAISAL

The county lies entirely within the Coastal Plain of east-central North Carolina. The topography is characterized by nearly flat interstream areas, although there may be minor bluffs along stretches of the major streams. The northern half of the county is drained by the Tar River and its tributaries. The southern half is drained by Contentnea Creek, Little Contentnea Creek and Swift Creek, all of which are tributaries of the Neuse River. Average stream discharge ranges from 0.84 (Mgal/d)/mi^2 in the southwestern part of the county to 0.71 (Mgal/d)/mi^2 in the eastern part of the county. Minimum flows range from 0 to 0.10 (Mgal/d)/mi^2 and average 0.012 (Mgal/d)/mi^2. The 7-day, 2-year low flow ranges from 0 to 0.34 (Mgal/d)/mi^2, and averages 0.049 (Mgal/d)/mi^2. The drainage area necessary to maintain flow during drought ranges from as little as 4 square miles to as much as 90 square miles.

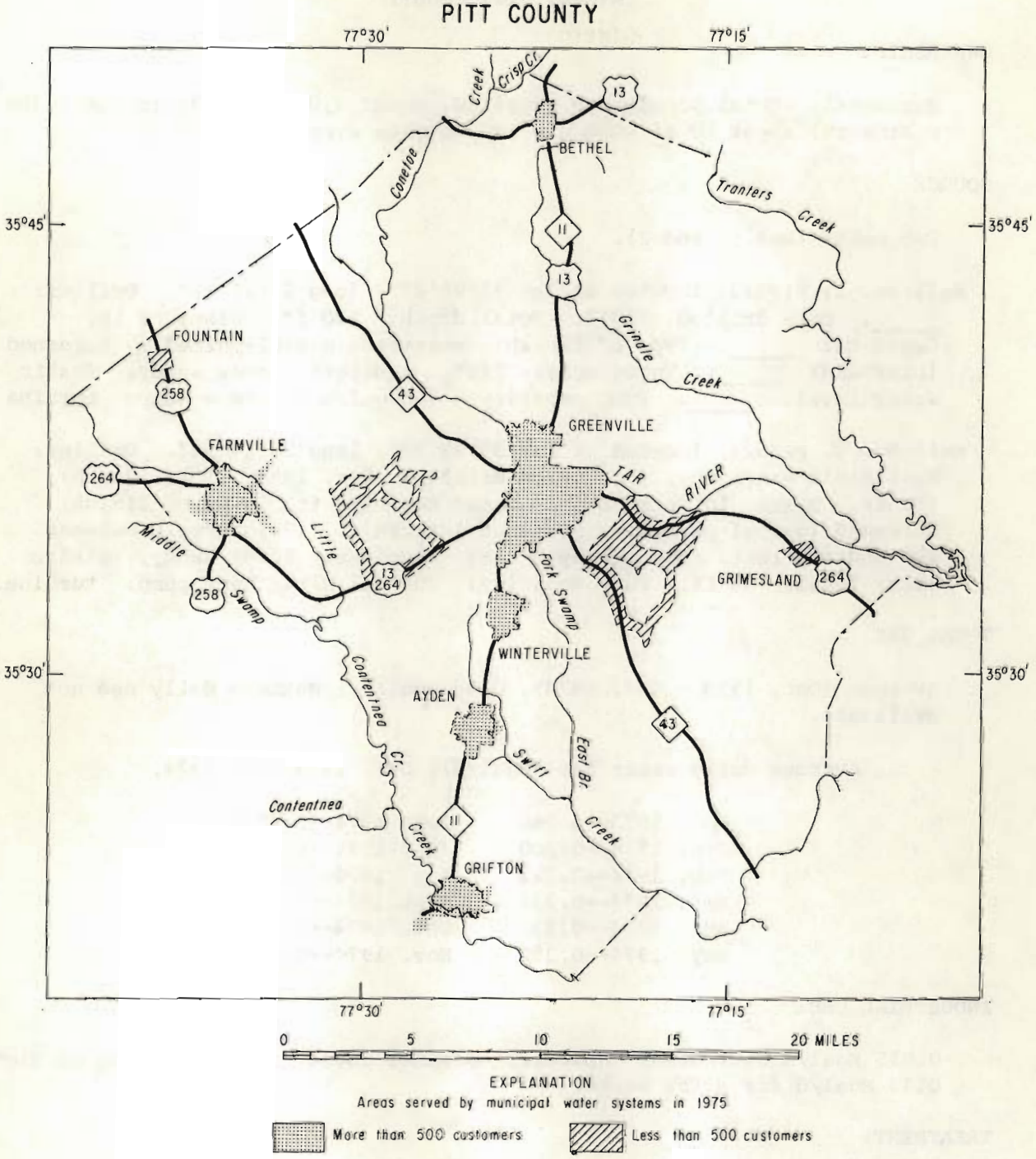
There are six public water supplies having 500 or more customers: Ayden, Bethel, Farmville, Greenville, Grifton, and Winterville. All of these, except Greenville, are supplied exclusively from ground water. Greenville is supplied in part from surface water and in part from ground water. The county population in 1970 was 73,900.

The county is covered by surficial sand and shale deposits of the upper sandy aquifer, which averages about 50 feet in thickness. In the eastern part of the county this aquifer may be underlain by the limestone aquifer, which has a maximum thickness of about 30 feet. Where thickest, the limestone aquifer might yield up to a few hundred gallons per minute. Underlying all of the county is the lower sandy aquifer having an average thickness of perhaps 1,200 feet. The lower sandy aquifer is capable of yielding between 250 to 1,000 gal/min to wells and is the principal source of municipal and industrial supplies.

The water from the upper sandy and limestone aquifers tends to be hard and acidic and have an excessive iron concentration. The water from the lower sandy aquifer is normally soft and alkaline. Excessive iron concentration is not common. In the eastern half of the county the lower part of the lower sandy aquifer contains water having excessive chloride content. There are only isolated occurrences of brackish water in this aquifer in the western half of the county.

The ground-water body is capable of supplying large industrial or municipal needs. The average amount of ground water available in Pitt County is about 0.89 (Mgal/d)/mi^2. However, the maximum recharge to the lower sandy aquifer is estimated at 0.06 (Mgal/d)/mi^2.

PITT COUNTY


77°30'
77°15'
35°45'
35°30'
Crisp Cr
Creek
13
BETHEL
Conetoe
Tranters
Creek
11
13
Grindle
Creek
FOUNTAIN
258
43
GREENVILLE
FARMVILLE
264
TAR
RIVER
Middle
Little
Fork Swamp
13
264
258
Swamp
GRIMESLAND
264
WINTERVILLE
Contentnea Cr
AYDEN
43
Swift
East Br
Creek
Contentnea
Creek
11
GRIFTON
0
5
10
15
20 MILES
EXPLANATION
Areas served by municipal water systems in 1975
More than 500 customers
Less than 500 customers

AYDEN, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 4,000 in 1974 (about 1,350 customers, about 60 of whom are in suburban areas).

SOURCE:

Two wells (Nos. 1 and 2).

Well No. 1, Pi-523, located at lat 35°28'07", long 77°25'16". Driller: _____. Date drilled: 1963. Total depth: 520 ft. Diam: 8 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: _____. Pump capacity: 700 gal/min. Type pump: turbine.

Well No. 2, Pi-524, located at lat 35°28'38", long 77°24'54". Driller: Hartsfield Water Co., Inc. Date drilled: Dec. 1968. Total depth: 490 ft. Diam: 10 in to 8 in. Cased to: 290 ft. Type of finish: screened (gravel-packed). Screened intervals: 13 intervals between 290 and 484 feet. Topography: flat. Aquifer: lower sandy. Static water level: 76 ft. Pump capacity: 700 gal/min. Type pump: turbine.

TOTAL USE:

Average (Dec. 1973 - Nov. 1974), 0.36 Mgal/d. Maximum daily use not available.

Average daily water use (Mgal/d), Dec. 1973-Nov. 1974.

Dec. 1973--0.360	June 1974--0.411
Jan. 1974--0.300	July 1974--0.442
Feb. 1974--0.312	Aug. 1974--0.362
Mar. 1974--0.326	Sept.1974--0.362
Apr. 1974--0.333	Oct. 1974--0.392
May 1974--0.352	Nov. 1974--0.374

INDUSTRIAL USE:

0.015 Mgal/d estimated. However, seasonal industrial use may be as high as 0.13 Mgal/d for a few weeks.

TREATMENT:

None.

PUMPING CAPACITY:

Raw water, 2.0 Mgal/d.

AYDEN, PITT COUNTY

RAW-WATER STORAGE:

One elevated tank, 300,000 gallons.

FUTURE PLANS:

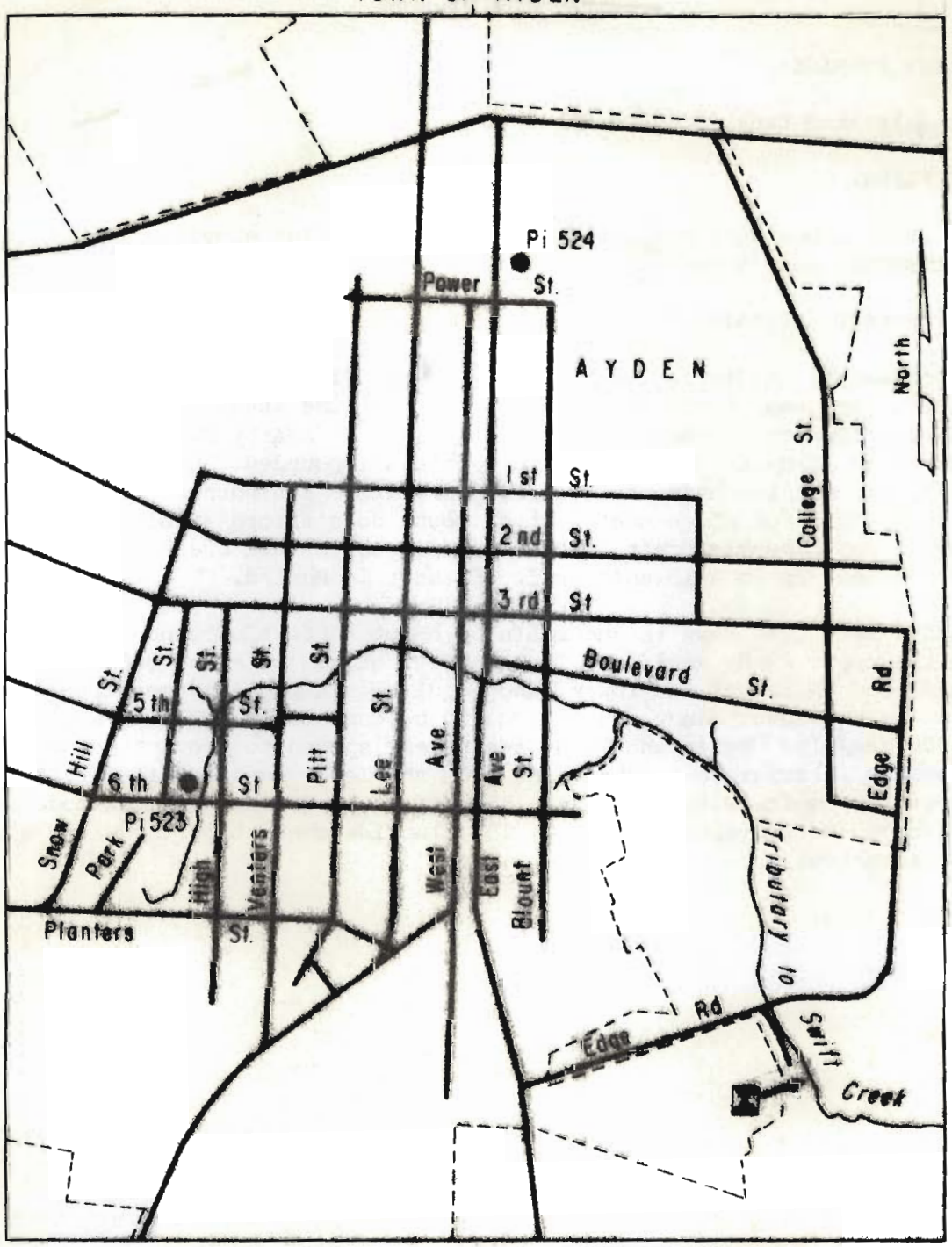
To drill a new well and construct a 500,000 gallon elevated tank within the next 5 years.

WATER-RESOURCES APPRAISAL:

Surface water: Ayden is located in southwest Pitt County on a flat interstream rise near Swift Creek, a tributary of the Neuse River. The average flow of streams is 0.75 $(Mgal/d)/mi^2$. Nearby Swift Creek would not be an adequate supply for Ayden unless impounded. The allowable draft without impoundment is zero. The Little Contentnea Creek, a distance of four miles southwest of town, does afford an alternative, having an allowable draft of 0.6 Mgal/d. Contentnea Creek at a distance of 5 miles has an allowable draft of about 14 Mgal/d.

Ground water: The town is underlain by about 40 feet of sands and shales of the upper sandy aquifer. These are underlain by about 800 feet of sands and shales of the lower sandy aquifer. A properly constructed well in the lower sandy aquifer should be capable of yielding well over 1,000 gal/min. Wells should be adequately spaced to prevent mutual drawdown interference. The water from the lower sandy aquifer tends to be very soft, with moderately high to high pH, and having a moderate dissolved-solids concentration. The fluoride content of the water may be excessive.

TOWN OF AYDEN



AYDEN, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1	Well No. 1	Well No. 2	
Date of collection.....	7-10-67	12-18-74	12-18-74	
Silica (SiO_2).....	11	----------	12	
Iron (Fe).....	.10	.010	.030	
Manganese (Mn).....	.01	.000	.000	
Calcium (Ca).....	1.4	----------	1.7	
Magnesium (Mg).....	.4	----------	.3	
Sodium (Na).....	98	----------	85	
Potassium (K).....	5.2	----------	5.2	
Bicarbonate (HCO_3).....	231	----------	205	
Carbonate (CO_3).....	0	----------	----------	
Alkalinity as $CaCO_3$.....	189	----------	----------	
Sulfate (SO_4).....	10	----------	8.4	
Chloride (Cl).....	19	16	13	
Fluoride (F).....	1.1	----------	1.1	
Nitrate (NO_3).....	.2	----------	----------	
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	.00	
Dissolved Solids.....	274	----------	228	
Hardness as $CaCO_3$:				
Total.....	8	----------	6	
Noncarbonate.....	0	----------	0	
Specific conductance (micromhos at 25°C)....	435	350	320	
Arsenic (As).....	----------	.000	.000	
Barium (Ba).....	----------	.000	.000	
Boron (B).....	----------	1.100	1.000	
Cadmium (Cd).....	----------	.000	.000	
Chromium (Cr).....	----------	.000	.000	
Cobalt (Co).....	----------	.000	.001	
Copper (Cu).....	----------	.001	.001	
Lead (Pb).....	----------	----------	----------	
Lithium (Li).....	----------	.000	.000	
Mercury (Hg).....	----------	----------	----------	
Strontium (Sr).....	----------	.040	.050	
Zinc (Zn).....	----------	.010	.150	
pH (units).....	7.5	----------	8.3	
Temperature (°C).....	19	----------	----------	

BETHEL, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied about 2,000 in 1974 (about 800 metered customers, 10 of whom are in suburban areas).

SOURCE:

Three wells (Nos. 1-3).

Well No. 1, Pi-23, (Smith St. Well), located at lat 35°48'17", long 77°22'48". Driller: Carolina Drilling and Equipment Co. Date drilled: Jan. 1961. Total depth: 316 ft. Diam: 8 in. Cased to: 166 ft. Type of finish: screened (gravel-packed). Screened intervals: 166-172 ft, 206-216 ft, 245-255 ft, 295-315 ft. Topography: flat. Aquifer: lower sandy. Static water level: 36 ft. Pump capacity: 400 gal/min. Pump setting: 110 ft. Type pump: turbine.

Well No. 2, Pi-22, (Whitehurst St. Well), located at lat 35°48'38", long 77°22'42". Driller: Southern Gulf Utilities, Inc. Date drilled: 1964. Total depth: 320 ft. Diam: 10 in to 8 in. Cased to: 240 ft. Type of finish: screened (gravel-packed). Screened intervals: 240-260 ft, 310-320 ft. Topography: flat. Aquifer: lower sandy. Static water level: 31 ft. Pump capacity: 375 gal/min. Type pump: turbine.

Well No. 3, Pi-527 (at new tank), located at lat 35°48'38", long 77°22'20". Driller: R. W. Magette. Date drilled: Oct. 1974. Total depth: 284 ft. Diam: 8 in. Cased to: 180 ft. Type of finish: screened (gravel-packed). Screened intervals: 180-195 ft, 214-219 ft, 230-250 ft, 259-262 ft, 273-283 ft. Topography: flat. Aquifer: lower sandy. Static water level: 57 ft. Well yield: 520 gal/min. Pump capacity: 500 gal/min. Pump setting: 140 ft. Type pump: submersible.

TOTAL USE:

Average (1974), 0.235 Mgal/d, estimated. Maximum daily use not available.

INDUSTRIAL USE:

0.001 Mgal/d, estimated.

TREATMENT:

Chlorination.

PUMPING CAPACITY:

Finished water, 1.84 Mgal/d.

RAW-WATER STORAGE:

None.

BETHEL, PITT COUNTY

FINISHED-WATER STORAGE:

One clear well, 200,000 gallons; two elevated tanks, 75,000 and 500,000 gallons.

FUTURE PLANS:

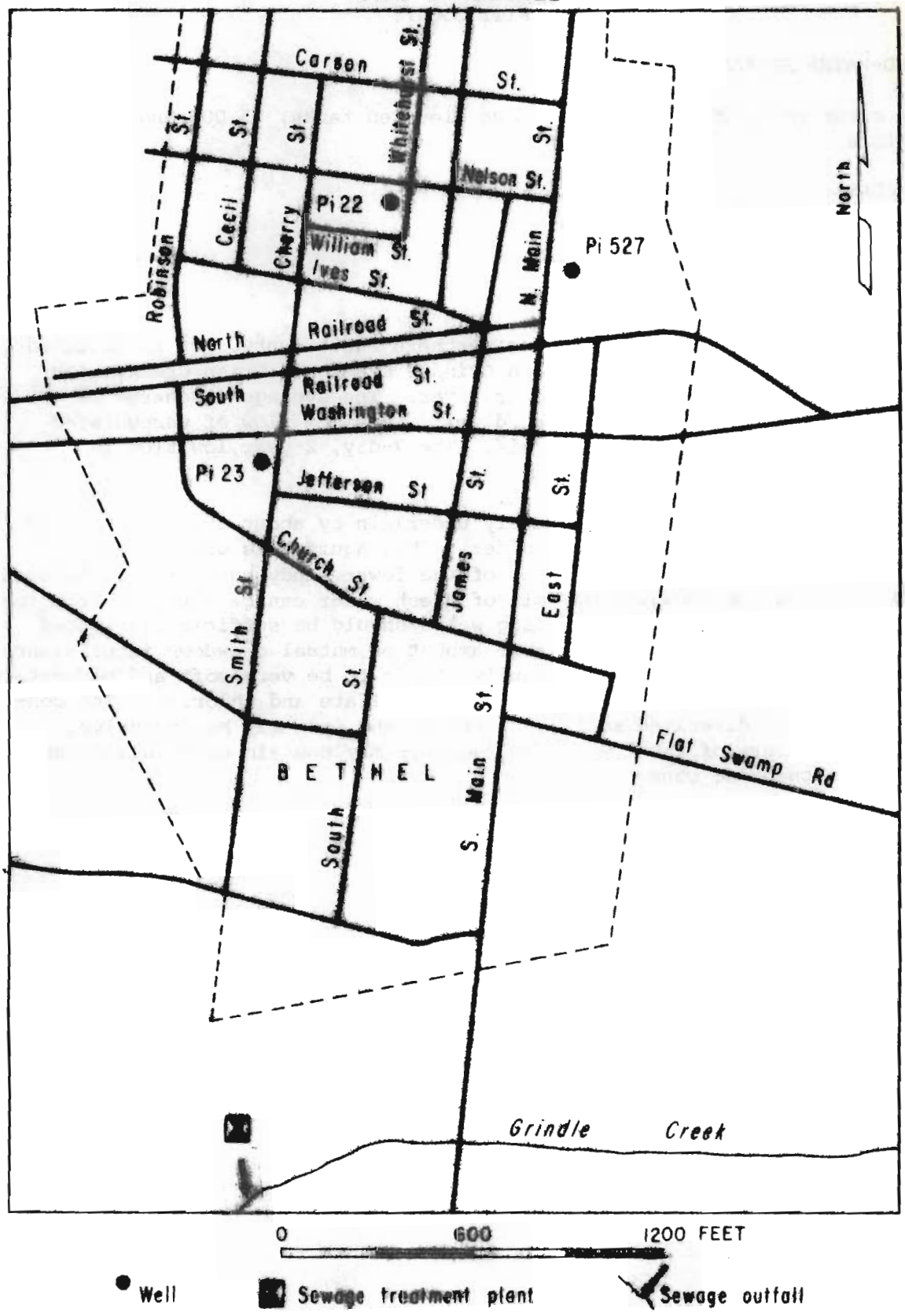
None.

WATER-RESOURCES APPRAISAL:

Surface water: Bethel is in extreme northern Pitt County. It is situated on a flat interstream area between Grindle Creek and Crisp Creek, both of which are tributaries of the Tar River. The average discharge of streams in the area is 0.73 $(Mgal/d)/mi^2$. Minimum flow of unregulated streams is about 0.023 $(Mgal/d)/mi^2$. The 7-day, 2-year low flow is about 0.047 $(Mgal/d)/mi^2$.

Ground water: The town is immediately underlain by about 20 feet of sands and shales of the upper sandy aquifer. This aquifer is underlain by about 550 feet of sands and shales of the lower sandy aquifer. Individual well yields of up to 1,000 gal/min of fresh water can be obtained from the lower sandy aquifer. High-yielding wells should be sufficiently spaced that they do not experience a large amount of mutual drawdown interference. The water from the lower sandy aquifer tends to be very soft and moderately alkaline, with moderate concentrations of sulfate and chloride. The concentrations of dissolved solids, fluoride, and iron may be excessive. The deepest part of the lower sandy aquifer may contain water having an excessive chloride concentration.

TOWN OF BETHEL



BETHEL, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Wells 1, 2[a] Raw			
Date of collection.....	9-27-74			
Silica (SiO_2).....	27			
Iron (Fe).....	.450			
Manganese (Mn).....	.000			
Calcium (Ca).....	5.9			
Magnesium (Mg).....	2.4			
Sodium (Na).....	200			
Potassium (K).....	14			
Bicarbonate (HCO_3).....	322			
Carbonate (CO_3).....	0			
Alkalinity as $CaCO_3$.....	264			
Sulfate (SO_4).....	67			
Chloride (Cl).....	100			
Fluoride (F).....	1.3			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.33			
Dissolved Solids.....	578			
Hardness as $CaCO_3$:				
Total.....	25			
Noncarbonate.....	0			
Specific conductance (micromhos at 25°C)....	954			
Arsenic (As).....	.001			
Barium (Ba).....	.000			
Boron (B).....	1.300			
Cadmium (Cd).....	.000			
Chromium (Cr).....	.000			
Cobalt (Co).....	.000			
Copper (Cu).....	.007			
Lead (Pb).....	----------			
Lithium (Li).....	.000			
Mercury (Hg).....	----------			
Strontium (Sr).....	.070			
Zinc (Zn).....	.050			
pH (units).....	7.6			
Temperature (°C).....	----------			

[a] Composite sample.

FARMVILLE, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 6,000 in 1974 (1,880 customers, of whom about 110 are in suburban areas).

SOURCE:

Eight wells (Nos. 1 and 3-9).

Well No. 1, (Park Ave. or Horton St. Well), Pi-219, located at lat 35°36'28", long 77°35'46". Driller: Layne-Atlantic Co. Date drilled: Aug. 1930. Total depth: 496-1/2 ft. Diam: 8 in to 6 in. Cased to: 215 ft. Type of finish: screened (gravel-packed). Screened intervals: 215-225 ft, 265-275 ft, 401-411 ft, 454-464 ft, 486-496 ft. Topography: flat. Aquifer: lower sandy. Static water level: 47 ft. Pump capacity: 250 gal/min. Type pump: turbine.

Well No. 3, (NW of power plant), Pi-220, located at lat 35°36'46", long 77°36'09". Driller: Layne-Atlantic Co. Date drilled: July 1938. Total depth: 481 ft. Diam: 10 in to 8 in. Cased to: 220 ft. Type of finish: screened (gravel-packed). Screened intervals: 220-230 ft, 260-270 ft, 470-480 ft. Topography: flat. Aquifer: lower sandy. Static water level: 22 ft. Pump capacity: 250 gal/min. Pump setting: 230 ft. Type pump: turbine.

Well No. 4, (Fields and Moore Sts. Well), Pi-218, located at lat 35°35'42", long 77°35'40". Driller: Layne-Atlantic Co. Date drilled: Aug. 1958. Total depth: 425 ft. Diam: 8 in. Cased to: 230 ft. Type of finish: screened (gravel-packed). Screened intervals (approximate): 230-250 ft, 290-310 ft, 405-415 ft. Topography: flat. Aquifer: lower sandy. Static water level: 129 ft. Pump capacity: 250 gal/min. Pump setting: 210 ft. Type pump: turbine.

Well No. 5, (Collins and Aikman Well), Pi-216, located at lat 35°36'20", long 77°35'38". Driller: Hartsfield Well Co. Date drilled: June 1964. Total depth: 304 ft. Diam: 10 in. Cased to: 215 ft. Type of finish: screened (gravel-packed). Screened intervals: 215-220 ft, 225-230 ft, 235-240 ft, 245-250 ft, 255-260 ft, 265-270 ft, 275-280 ft, 285-290 ft, 300-304 ft. Topography: flat. Aquifer: lower sandy. Static water level: 106 ft. Pump capacity: 500 gal/min. Pump setting: 209 ft. Type pump: turbine.

Well No. 6, (Lincoln Park Well), Pi-217, located at lat 35°35'18", long 77°35'39". Driller: Hartsfield Well Co. Date drilled: Nov. 1963. Total depth: 338 ft. Diam: 10 in. Cased to: 192 ft. Type of finish: screened (gravel-packed). Screened intervals: 192-196 ft, 207-211 ft, 211-215 ft, 229-233 ft, 236-240 ft, 244-248 ft, 252-256 ft, 273-277 ft, 281-285 ft, 311-319 ft, 327-331 ft, 331-335 ft. Topography: flat. Aquifer: lower sandy. Static water level: 147 ft. Pump capacity: 370 gal/min. Pump setting: 223 ft. Type pump: turbine.

FARMVILLE, PITT COUNTY

Well No. 7, (East Church St. Well), Pi-215, located at lat 35°35'29", long 77°34'47". Driller: Hartsfield Well Co. Date drilled: Sept. 1963. Total depth: 325 ft. Diam: 10 in. Cased to: 155 ft. Type of finish: screen (gravel-packed). Screened intervals (approximate): 155-160 ft, 165-170 ft, 212-217 ft, 237-242 ft, 248-253 ft, 257-262 ft, 270-275 ft, 282-287 ft, 293-298 ft, 302-308 ft, 315-322 ft. Topography: flat. Aquifer: lower sandy. Static water level: 157 ft. Pump capacity: 350 gal/min. Pump setting: 251 ft. Type pump: turbine.

Well No. 8, (Marlboro Well), Pi-525, located at lat 35°34'58", long 77°35'54". Driller: Hartsfield Water Co. Date drilled: _____. Total depth: 334 ft. Diam: 10 in. Cased to: 204 ft. Type of finish: screened (gravel-packed). Screened intervals: 204-212 ft, 222-226 ft, 230-234 ft, 240-244 ft, 248-256 ft, 268-272 ft, 276-280 ft, 290-294 ft, 300-304 ft, 312-316 ft, 320-324 ft. Topography: flat. Aquifer: lower sandy. Static water level: 101 ft. Pump capacity: 480 gal/min. Pump setting: 230 ft. Type pump: turbine.

Well No. 9, (Chinquapin Well), Pi-526, located at lat 35°34'38", long 77°33'06". Driller: Hartsfield Water Co. Date drilled: _____. Total depth: 342 ft. Diam: 10 in. Cased to: 184 ft. Type of finish: screened (gravel-packed). Screened intervals: 184-192 ft, 202-206 ft, 222-226 ft, 236-240 ft, 262-266 ft, 270-286 ft, 294-298 ft, 318-322 ft, 334-342 ft. Topography: flat. Aquifer: lower sandy. Static water level: 110 ft. Pump capacity: 600 gal/min. Type pump: turbine.

TOTAL USE:

Average (1973-74), 1.56 Mgal/d, metered. Maximum daily use not available.

INDUSTRIAL USE:

1.20 Mgal/d, metered. Principal users include Collins and Aikman, Inc., A. C. Monk and Co., and U. S. Industries, Inc.

TREATMENT:

Well Nos. 6, 7, and 9 are chlorinated. Well Nos. 4, 6 and 7 are treated with polyphosphate.

RATED CAPACITY OF TREATMENT PLANT:

None.

PUMPING CAPACITY:

4.39 Mgal/d.

FARMVILLE, PITT COUNTY

FINISHED-WATER STORAGE:

One clear well, 75,000 gallons. Three elevated tanks, 500,000, 500,000, and 300,000 gallons.

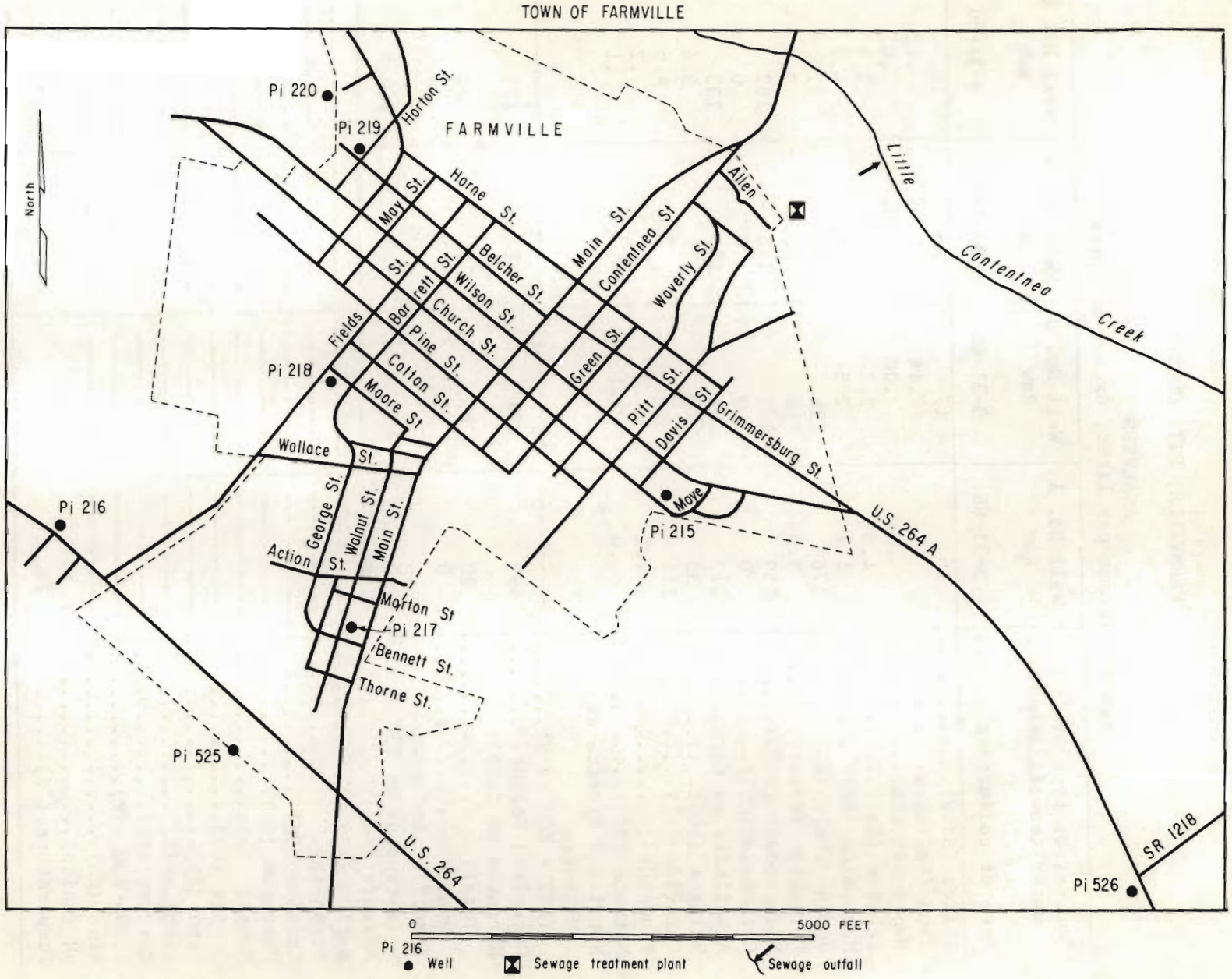
FUTURE PLANS:

To put on line two newly-drilled 500-gal/min wells, which will increase pumping capacity to 5.83 Mgal/d.

WATER-RESOURCES APPRAISAL:

Surface water: Farmville is in west-central Pitt County. The area is drained by Little Contentnea and Middle Swamp Creeks, which are tributaries of the Neuse River. The low-flow yield of streams in the vicinity is very small, averaging .0005 $(Mgal/d)/mi^2$. The average discharge of all streams in the area is 0.83 $(Mgal/d)/mi^2$, and the 7-day, 2-year low-flow yield averages 0.02 $(Mgal/d)/mi^2$.

Ground water: The town is underlain by about 50 feet of sands and shales of the upper sandy aquifer. These are underlain by about 400 feet of sands and shales of the lower sandy aquifer. This aquifer is capable of yielding about 1,000 gal/min to individual wells. The heavy pumping by the town has caused the artesian head in the lower sandy aquifer to decline to the point that static water levels of 100 feet or more below land surface are common in the area. Although the more recent wells are being spaced properly to minimize drawdown interference between the wells, it is inevitable that the increasing pumpage in the area will cause the artesian head to continue to decline. The water from the lower sandy aquifer is low in hardness, with moderate to high dissolved solids concentration, and moderate to high alkalinity. Near the base of the lower sandy aquifer there may be isolated occurrences of water having excessive chloride. There are some instances of excessive fluoride concentrations.


TOWN OF FARMVILLE
FARMVILLE
Pi 220
Pi 219
Horton St.
North
Moy St.
Horne St.
Main St.
Contentnea St
Allen
Little
Contentnea Creek
Barrett St.
Wilson St.
Belcher St.
Church St.
Pine St.
Cotton St.
Fields
Pi 218
Moore St
Waverly St.
Green St.
Pitt St.
Davis St
Grimmersburg St.
Wallace St.
Moye
Pi 215
U.S. 264 A
Pi 216
George St.
Walnut St.
Main St.
Action St.
Morton St
Pi 217
Bennett St.
Thorne St.
Pi 525
U.S. 264
SR 1218
Pi 526
0
5000 FEET
Pi 216
Well
Sewage treatment plant
Sewage outfall

FARMVILLE, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 3 Raw	Well No. 4 Raw	Well No. 6 Raw
Date of collection.....	3-31-66	3-31-66	3-31-66	3-31-66
Silica (SiO_2).....	16	17	15	18
Iron (Fe).....	.14	.14	.09	.22
Manganese (Mn).....	.01	.00	.02	.01
Calcium (Ca).....	4.8	2.2	2.9	2.2
Magnesium (Mg).....	1.7	2.3	1.7	4.7
Sodium (Na).....	176	126	72	52
Potassium (K).....	9.0	10	8.2	9.0
Bicarbonate (HCO_3).....	259	225	186	162
Carbonate (CO_3).....	0	0	0	0
Alkalinity as $CaCO_3$.....	212	184	153	133
Sulfate (SO_4).....	35	26	12	3.4
Chloride (Cl).....	111	67	7.6	4.6
Fluoride (F).....	1.2	.8	.5	.2
Nitrate (NO_3).....	.0	.1	.1	.1
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	499	375	222	175
Hardness as $CaCO_3$:				
Total.....	20	15	14	24
Noncarbonate.....	0	0	0	0
Specific conductance (micromhos at 25°C)....	840	608	329	270
Arsenic (As).....	----------	----------	----------	----------
Barium (Ba).....	----------	----------	----------	----------
Boron (B).....	----------	----------	----------	----------
Cadmium (Cd).....	----------	----------	----------	----------
Chromium (Cr).....	----------	----------	----------	----------
Cobalt (Co).....	----------	----------	----------	----------
Copper (Cu).....	----------	----------	----------	----------
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	----------
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	----------
Zinc (Zn).....	----------	----------	----------	----------
pH (units).....	8.1	7.9	7.4	7.5
Temperature (°C).....	18	17	18	17

FARMVILLE, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 7 Raw	Well No. 5 Raw		
Date of collection.....	3-31-66	12-19-74		
Silica (SiO_2).....	16	18		
Iron (Fe).....	.04	.170		
Manganese (Mn).....	.00	.021		
Calcium (Ca).....	4.0	4.0		
Magnesium (Mg).....	2.0	3.3		
Sodium (Na).....	69	46		
Potassium (K).....	7.4	8.0		
Bicarbonate (HCO_3).....	198	148		
Carbonate (CO_3).....	0	0		
Alkalinity as $CaCO_3$.....	162	121		
Sulfate (SO_4).....	3.6	5.6		
Chloride (Cl).....	5.4	3.6		
Fluoride (F).....	.4	.2		
Nitrate (NO_3).....	.2	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	.00		
Dissolved Solids.....	209	162		
Hardness as $CaCO_3$:				
Total.....	19	24		
Noncarbonate.....	0	0		
Specific conductance (micromhos at 25°C)....	326	215		
Arsenic (As).....	----------	.000		
Barium (Ba).....	----------	.000		
Boron (B).....	----------	.290		
Cadmium (Cd).....	----------	.000		
Chromium (Cr).....	----------	.000		
Cobalt (Co).....	----------	.000		
Copper (Cu).....	----------	.000		
Lead (Pb).....	----------	----------		
Lithium (Li).....	----------	.000		
Mercury (Hg).....	----------	----------		
Strontium (Sr).....	----------	.070		
Zinc (Zn).....	----------	.000		
pH (units).....	8.0	7.3		
Temperature (°C).....	18	----------		

GREENVILLE, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 32,000 in 1973 (9,371 metered customers, 14 of which are in suburban areas).

SOURCES:

Tar River. The intakes are on the south bank of the river approximately 20 feet upstream from the Seaboard Coastline railroad bridge at lat 35°37'03", long 77°22'40". The drainage area at the intakes is 2,620 square milles, approximately.

Six wells (Nos. 1-6)

Well No. 1, Pi-466, located at lat 35°36'13", long 77°22'36". Driller: Heater Well Company. Date drilled: June 1956. Total depth: 460 ft. Diam: 12 in to 10 in. Cased to: 167 ft. Type of finish: screened. Screened intervals: 17 screens between 167 and 460 ft. Topography: flat. Aquifer: lower sandy. Static water level: 105 ft. Pump capacity: 400 gal/min. Pump setting: 180 ft. Type pump: submersible.

Well No. 2, Pi-518, located at lat 35°35'25", long 79°20'54". Driller: Layne-Atlantic Company. Date drilled: Feb. 1961. Total depth: 490 ft. Diam: 12 in to 10 in. Cased to: 200 ft. Type of finish: screened (gravel-packed). Screened intervals: several intervals between 200 and 400 ft. Topography: flat. Aquifer: lower sandy. Static water level: 105 ft. Pump capacity: 500 gal/min. Pump setting: 180 ft. Type pump: turbine.

Well No. 3, Pi-519, located at lat 35°39'04", long 77°21'33". Driller: Hartsfield Water Co. Date drilled: May 1969. Total depth: 454 ft. Diam: 14 in to 12 in. Cased to: 176 ft. Type of finish: screened (gravel-packed). Screened intervals: 18 screens between 176 and 454 ft. Topography: flat. Aquifer: lower sandy. Static water level: 110 ft. Pump capacity: 400 gal/min. Type pump: submersible.

Well No. 4, Pi-520, located at lat 35°34'31", long 77°23'09". Driller: Hartsfield Water Co. Date drilled: March 1969. Total depth: 458 ft. Diam: 14 in to 12 in. Cased to: 192 ft. Type of finish: screened (gravel-packed). Screened intervals: 17 screens between 192 and 458 ft. Topography: flat. Aquifer: lower sandy. Static water level: 120 ft. Pump capacity: 700 gal/min. Type pump: submersible.

Well No. 5, Pi-521, located at lat 35°37'56", long 77°22'23". Driller: Hartsfield Water Co. Date drilled: Sept. 1969. Total depth: 404 ft. Diam: 12 in to 10 in. Cased to: _____. Type of finish: screened (gravel-packed). Screened intervals: 9 screens above 404 ft. Topography: flat. Aquifer: lower sandy. Static water level: 110 ft. Pump Capacity: 500 gal/min. Type pump: submersible.

GREENVILLE, PITT COUNTY

Well No. 6, Pi-522, located at lat 35°35'27", long 77°23'10". Driller: Singer-Layne Atlantic Co. Date drilled: July 1972. Total depth: 457 ft. Diam: 12 in to 10 in. Cased to: 210 ft. Type of finish: screened (gravel-packed). Screened intervals: 8 screens between 210 and 452 ft. Topography: flat. Aquifer: lower sandy. Static water level: 120 ft. Well yield: 400 gal/min. Pump capacity: 350 gal/min. Type pump: submersible.

RAW-WATER STORAGE:

None.

ALLOWABLE DRAFT:

Estimated allowable draft of Tar River is 35 Mgal/d with no storage.

TOTAL USE:

Average (1973), 4.65 Mgal/d, metered; maximum daily (9-15-72), 6.7 million gallons.

Average daily water use Mgal/d, 1973

Jan.--4.64	May --4.78	Sept.--5.23
Feb.--4.50	June--4.82	Oct. --5.12
Mar.--4.30	July--4.55	Nov. --4.65
Apr.--4.33	Aug.--4.96	Dec. --3.90

INDUSTRIAL USE:

2.8 Mgal/d, estimated. Principal users Burroughs Welcome Company, Union Carbide Corporation, Fieldcrest Mills, and Greenville Packing Company.

TREATMENT:

Ground water: chlorination.

Surface water: prechlorination, coagulation with alum and caustic soda, sedimentation, addition of carbon for control of taste and odor, rapid anthracite and sand filtration, addition of phosphate compounds for corrosion control, adjustment of pH with caustic soda, postchlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

6.0 Mgal/d.

GREENVILLE, PITT COUNTY

PUMPING CAPACITY:

Ground water: 4.1 Mgal/d. Water is pumped direct to the distribution system at various points.

Surface water: raw water, 9.0 Mgal/d; finished water, 8.0 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 100,000 gallons; six elevated tanks, 2 with 500,000 each, and 4 with 300,000 each; 2 ground storage tanks, 250,000 each.

FUTURE PLANS:

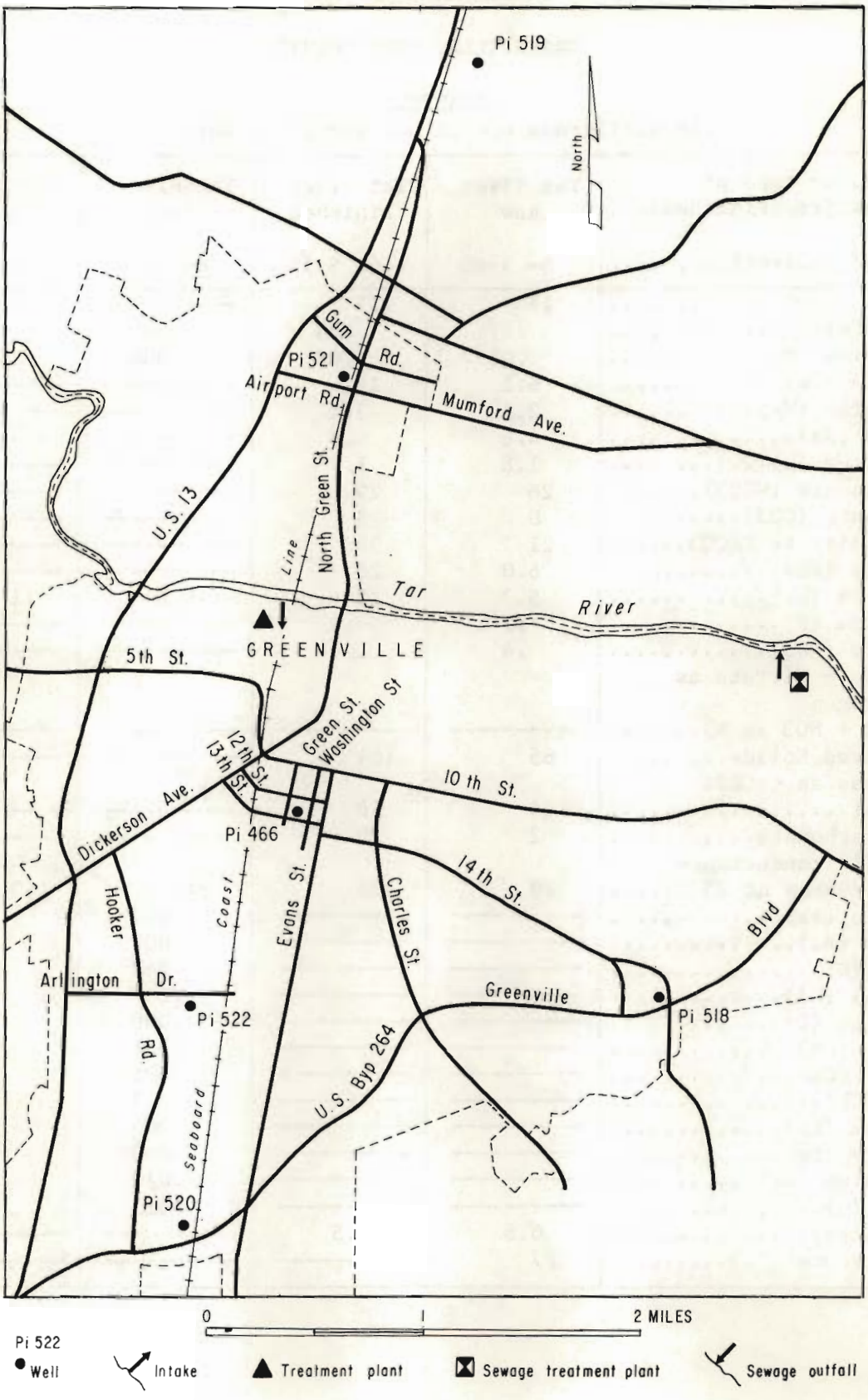
Drilling a new well in 1974.

WATER-RESOURCES APPRAISAL:

Surface water: The allowable draft from the Tar River at Greenville is 35 Mgal/d, which is more than enough to satisfy the foreseeable needs of the city.

Ground water: Greenville is underlain by about 50 feet of sands and shales of the upper sandy aquifer. These deposits are underlain by sands and shales of the lower sandy aquifer having a total thickness of about 800 feet. Wells in the lower sandy aquifer are capable of yielding up to 1,000 gal/min of fresh water to individual wells. It is desirable to space high-yielding wells sufficiently to minimize their drawdowns upon each other. Even so, when there are many wells drawing water from a poorly-recharged aquifer, such as the lower sandy aquifer, the collective drawdowns combine to cause regional drawdown. The static levels of the Greenville wells are all more than 100 feet below land surface. With time and increased pumpage this regional drawdown will become even more severe. In addition to increased pumping costs, the lowered head in the formation will cause brackish-water encroachment into the producing zones. The brackish water is now contained in the beds underlying the producing beds and also within the producing beds east of Greenville. It may be many years before the effects of the lateral or vertical encroachment are obvious. The subsequent damage could be minimized if countermeasures, such as pumping out the encroaching water, are taken early enough. The water from the fresh-water zone presently tends to be very soft and moderately alkaline, with moderate dissolved solids and excessive fluoride concentrations.

CITY OF GREENVILLE



GREENVILLE, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Tar River Raw	Tar River Finished	Tar River Raw	Tar River Finished
Date of collection.....	6- 9-66	6- 9-66	6- 7-74	6- 7-74
Silica (SiO_2).....	15	15	----------	----------
Iron (Fe).....	.27	.03	.280	.020
Manganese (Mn).....	.02	.02	.000	.014
Calcium (Ca).....	6.1	19	----------	----------
Magnesium (Mg).....	2.1	2.2	----------	----------
Sodium (Na).....	4.6	4.8	----------	----------
Potassium (K).....	1.8	1.7	----------	----------
Bicarbonate (HCO_3).....	26	29	----------	----------
Carbonate (CO_3).....	0	3	----------	----------
Alkalinity as $CaCO_3$.....	21	30	----------	----------
Sulfate (SO_4).....	6.0	20	----------	----------
Chloride (Cl).....	5.7	12	5.8	11
Fluoride (F).....	.2	.9	----------	----------
Nitrate (NO_3).....	.4	1.4	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	65	104	----------	----------
Hardness as $CaCO_3$:				
Total.....	24	58	----------	----------
Noncarbonate.....	2	29	----------	----------
Specific conductance (micromhos at 25°C)....	79	156	84	160
Arsenic (As).....	----------	----------	.002	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.040	.020
Cadmium (Cd).....	----------	----------	.009	.012
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.001	.001
Copper (Cu).....	----------	----------	.025	.003
Lead (Pb).....	----------	----------	.003	.006
Lithium (Li).....	----------	----------	.000	.000
Mercury (Hg).....	----------	----------	.0000	.0001
Strontium (Sr).....	----------	----------	.030	.030
Zinc (Zn).....	----------	----------	.010	.007
pH (units).....	6.5	8.5	----------	----------
Temperature (°C).....	27	----------	----------	----------

GREENVILLE, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 2 Raw			
Date of collection.....	6- 7-74			
Silica (SiO_2).....	14			
Iron (Fe).....	.030			
Manganese (Mn).....	.000			
Calcium (Ca).....	4.9			
Magnesium (Mg).....	.9			
Sodium (Na).....	110			
Potassium (K).....	6.5			
Bicarbonate (HCO_3).....	288			
Carbonate (CO_3).....	----------			
Alkalinity as $CaCO_3$.....	236			
Sulfate (SO_4).....	8.6			
Chloride (Cl).....	6.8			
Fluoride (F).....	1.8			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.13			
Dissolved Solids.....	296			
Hardness as $CaCO_3$:				
Total.....	16			
Noncarbonate.....	0			
Specific conductance (micromhos at 25°C)....	456			
Arsenic (As).....	.002			
Barium (Ba).....	.000			
Boron (B).....	1.500			
Cadmium (Cd).....	.008			
Chromium (Cr).....	.000			
Cobalt (Co).....	.000			
Copper (Cu).....	.000			
Lead (Pb).....	----------			
Lithium (Li).....	.000			
Mercury (Hg).....	----------			
Strontium (Sr).....	.000			
Zinc (Zn).....	.003			
pH (units).....	----------			
Temperature (°C).....	----------			

GRIFTON, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 2,200 in 1974 (723 metered customers, 4 of whom are in suburban areas).

SOURCE:

Two wells (Nos. 1 and 2).

Well No. 1, Pi-371, located at lat 35°22'39", long 77°26'06". Driller: R. L. Magette Well Drilling Co. Date drilled: Aug. 1962. Total depth: 462 ft. Diam: 10 in. Cased to: 280 ft. Type of finish: screened (gravel-packed). Screened intervals: 280-292 ft, 332-340 ft, 372-384 ft, 437-457 ft. Topography: flat. Aquifer: lower sandy. Static water level: 22 ft. Pump capacity: 380 gal/min. Pump setting: 140 ft. Type pump: turbine.

Well No. 2 (Emergency use only), Pi-375, located at lat 35°22'29", long 77°25'42". Driller: _____. Date drilled: June 1954. Total depth: 132 ft. Diam: 8 in. Cased to: 59 ft. Type of finish: screened. Screened intervals: 59-62 ft. 70-75 ft, 78-81 ft, 95-100 ft, 105-113 ft, 125-132 ft. Topography: flat. Aquifer: lower sandy. Static water level: 21 ft. Pump capacity: 85 gal/min. Type pump: turbine.

TOTAL USE:

Average (1974), 0.2 Mgal/d estimated; maximum daily (2-28-72), 0.29 million gallons, estimated.

INDUSTRIAL USE:

0.003 Mgal/d, metered. Principal users include Cox Trailer, Inc. and E. I. DuPont de Nemours and Co., Inc.

TREATMENT:

Chlorination (well No. 1 only).

RATED CAPACITY OF TREATMENT PLANT:

None. Chlorination at pump.

PUMPING CAPACITY:

Raw water, 0.67 Mgal/d; finished water, 0.55 Mgal/d.

RAW-WATER STORAGE:

None.

GRIFTON, PITT COUNTY

FINISHED-WATER STORAGE:

One elevated tank, 60,000 gallons.

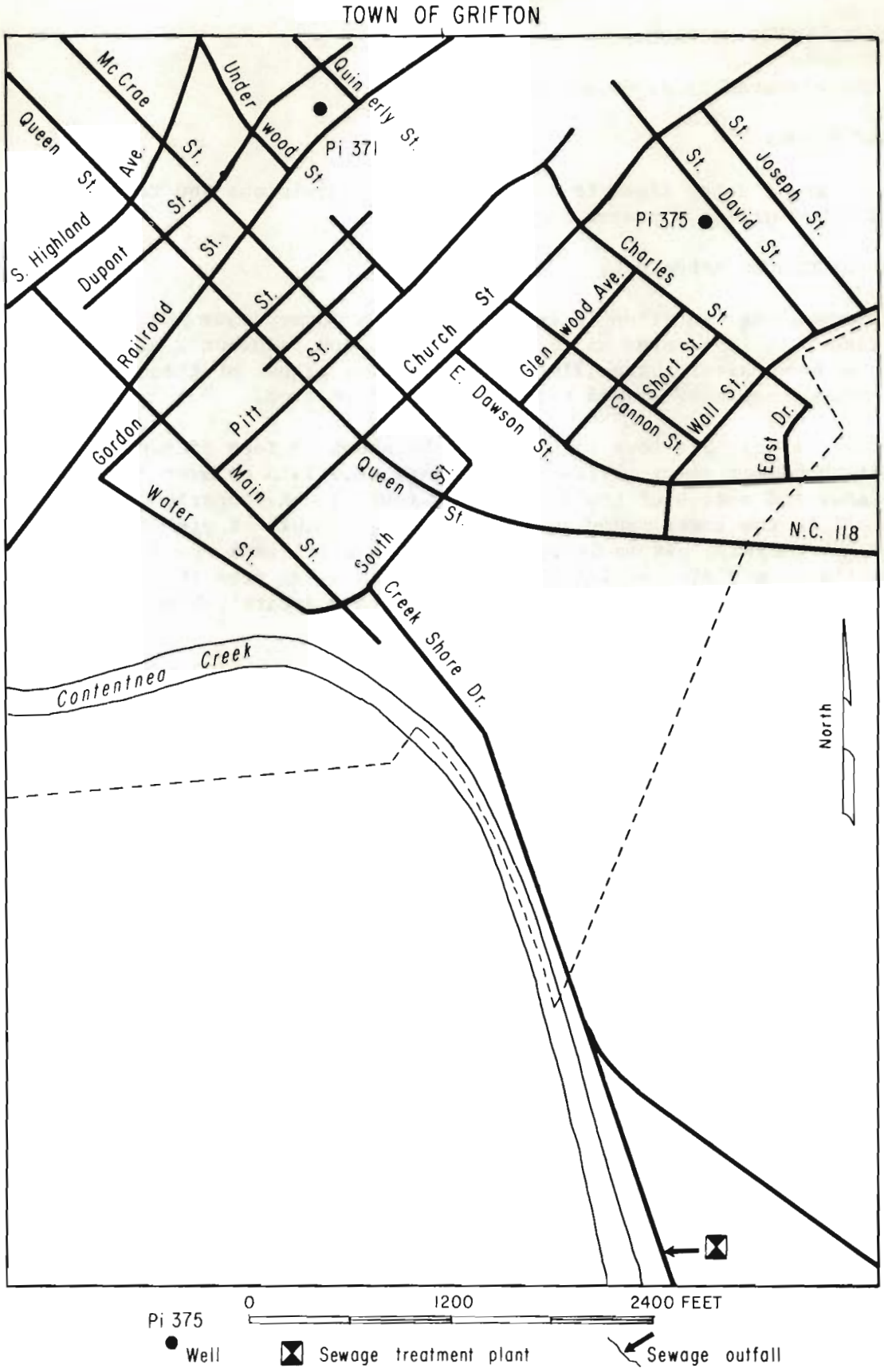
FUTURE PLANS:

To extend water lines to newly-annexed subdivisions and to erect a 200,000-gallon elevated tank.

WATER-RESOURCES APPRAISAL:

Surface water: Grifton is in southern Pitt County near the Lenoir County line. It is located on Contentnea Creek and is about 2 miles north of the Neuse River. The allowable draft from either of these streams far exceeds any anticipated need in the Grifton area.

Ground water: The town is underlain by about 30 feet of sandy deposits of the upper sandy aquifer. These are underlain by over 800 feet of sands and shales of the lower sandy aquifer. A properly constructed well in the lower sandy aquifer might be capable of yielding up to 2,000 gal/min. It is important to allow sufficient spacing between wells to minimize well interference. The water from the lower sandy aquifer tends to be extremely soft, has a moderately high pH, and a low dissolved-solids concentration.


TOWN OF GRIFTON
Mc Crae
Under wood
Quinerly St.
Queen St.
Ave.
St.
Pi 371
St.
St.
S. Highland
Dupont
St.
Railroad
St.
St.
Church St
St. Joseph St.
St. David St.
Pi 375
Charles St.
Glen wood Ave.
Short St.
Wall St.
East Dr.
E. Dawson St.
Cannon St.
Gordon
Pitt
Main
Queen St.
Water St.
St.
South St.
N.C. 118
Creek Shore Dr.
Contentnea Creek
North
0
1200
2400 FEET
Pi 375
Well
Sewage treatment plant
Sewage outfall

GRIFTON, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 1 Finished	Well No. 1 Finished
Date of collection.....	10- 8-64	10- 8-64	12-18-74
Silica (SiO_2).....	11	11	----------
Iron (Fe).....	.06	.01	.000
Manganese (Mn).....	.01	.00	.000
Calcium (Ca).....	.6	1.0	----------
Magnesium (Mg).....	.2	.2	----------
Sodium (Na).....	69	65	----------
Potassium (K).....	4.2	4.2	----------
Bicarbonate (HCO_3).....	156	154	----------
Carbonate (CO_3).....	0	0	----------
Alkalinity as $CaCO_3$.....	128	126	----------
Sulfate (SO_4).....	4.4	4.4	----------
Chloride (Cl).....	12	12	12
Fluoride (F).....	.5	.5	----------
Nitrate (NO_3).....	.4	1.0	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------
Dissolved Solids.....	182	183	----------
Hardness as $CaCO_3$:			
Total.....	4	4	----------
Noncarbonate.....	0	0	----------
Specific conductance (micromhos at 25°C)....	278	282	250
Arsenic (As).....	----------	----------	.000
Barium (Ba).....	----------	----------	.000
Boron (B).....	----------	----------	.630
Cadmium (Cd).....	----------	----------	.003
Chromium (Cr).....	----------	----------	.000
Cobalt (Co).....	----------	----------	.001
Copper (Cu).....	----------	----------	.001
Lead (Pb).....	----------	----------	----------
Lithium (Li).....	----------	----------	.000
Mercury (Hg).....	----------	----------	----------
Strontium (Sr).....	----------	----------	.040
Zinc (Zn).....	----------	----------	.030
pH (units).....	7.8	7.8	----------
Temperature (°C).....	17	----------	----------

WINTERVILLE, PITT COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 1,500 in 1974 (700 customers, about 30 of whom are in suburban areas).

SOURCE:

Two wells (Nos. 1 and 2). Well No. 2 is a standby well.

Well No. 1 (formerly Well No. 3), Pi-264, located at lat 35°31'44", long 77°24'03". Driller: Hartsfield Water Co., Inc. Date drilled: Jan. 1962. Total depth: 396 ft. Diam: 8 in. Cased to: 350 ft. Type of finish: screened (gravel-packed). Screened intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: 43 ft. Pump capacity: 250 gal/min. Type pump: turbine.

Well No. 2, Pi-263, located at lat 35°31'44", long 77°24'03". Driller: Carolina Drilling Co. Date drilled: Oct. 1946. Total depth: 306 ft. Diam: 8 in. Cased to: 300 ft. Type of finish: slotted pipe (gravel-packed). Slotted intervals: _____. Topography: flat. Aquifer: lower sandy. Static water level: 12 ft. Pump capacity: 250 gal/min. Type pump: turbine.

TOTAL USE:

Average, estimated at 0.18 Mgal/d.

INDUSTRIAL USE:

0.037 Mgal/d, estimated.

TREATMENT:

None.

PUMPING CAPACITY:

0.72 Mgal/d.

RAW-WATER STORAGE:

One elevated tank, 75,000 gallons.

FUTURE PLANS:

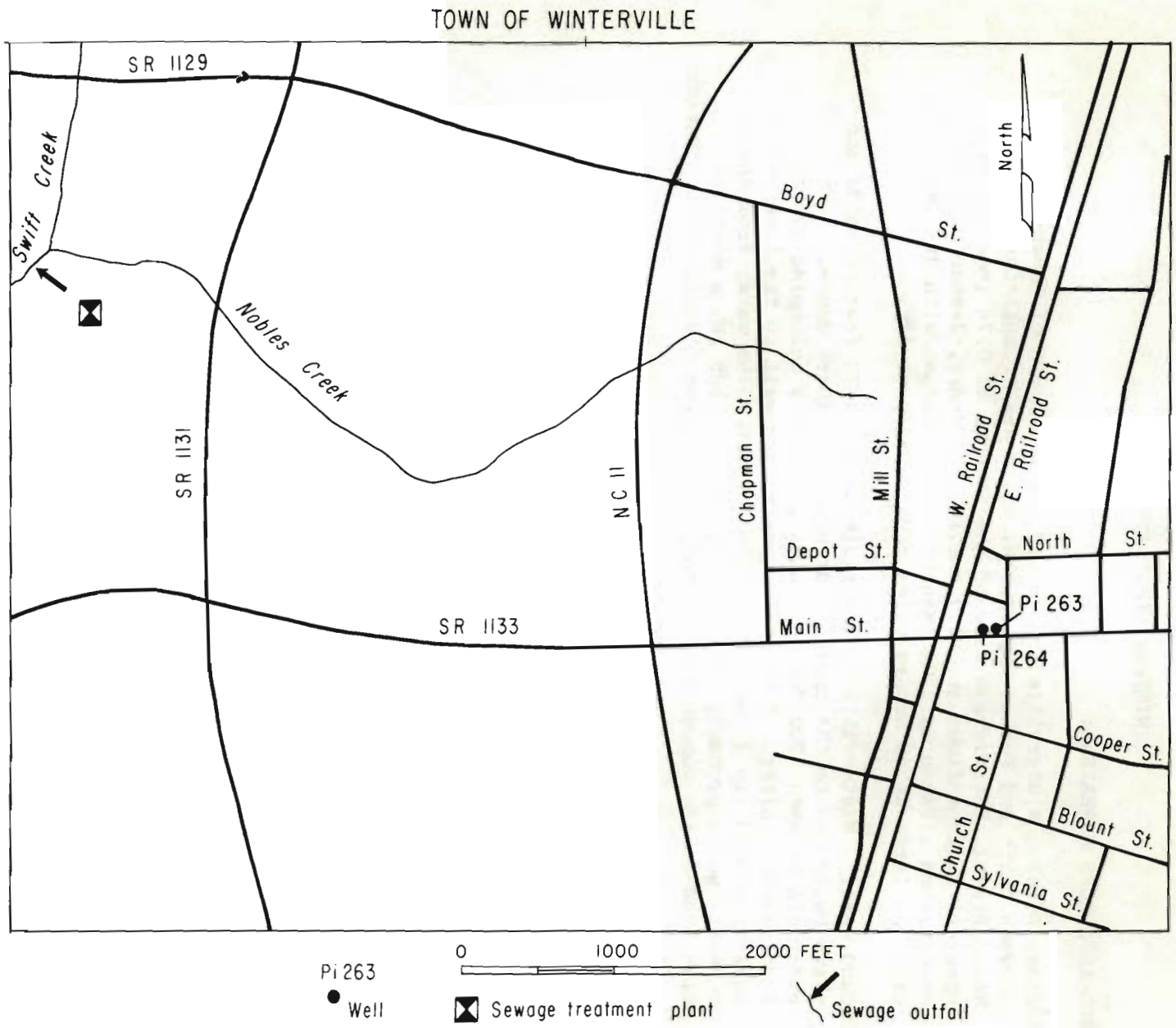
To drill an additional well, to construct a 500,000-gallon elevated tank, and to extend a water line south to a proposed industrial zone.

WINTERVILLE, PITT COUNTY

WATER-RESOURCES APPRAISAL:

Surface water: Winterville is located 5 miles south of Greenville, between Swift and Fork Swamp Creeks, which are tributaries of the Neuse River. The average flow of the streams is 0.78 (Mgal/d)/mi^2. However, minimum flows are very small. The 7-day, 2-year flow of unregulated streams is 0.02 (Mgal/d)/mi^2. Streams with drainage areas as large as 25 square miles occasionally go dry.

Ground water: Winterville is underlain by 20 to 70 feet of sands and clays belonging to the upper sandy aquifer. These deposits are underlain by about 700 feet of sands and shales belonging to the lower sandy aquifer. A properly constructed well in the lower sandy aquifer should yield more than 1,000 gal/min. The water from these deposits would probably be very soft, with a high pH, a moderate dissolved-solids concentration, and an excessive fluoride concentration.


TOWN OF WINTERVILLE
SR 1129
Swift Creek
Boyd St.
North
Nobles Creek
SR 1131
NC 11
Chapman St.
Mill St.
W. Railroad St.
E. Railroad St.
Depot St.
North St.
Pi 263
SR 1133
Main St.
Pi 264
Cooper St.
St.
Church
Blount St.
Sylvania St.
0 1000 2000 FEET
Pi 263
Well
Sewage treatment plant
Sewage outfall

WINTERVILLE, PITT COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1			
Date of collection.....	12-19-74			
Silica (SiO_2).....	12			
Iron (Fe).....	.020			
Manganese (Mn).....	.000			
Calcium (Ca).....	2.7			
Magnesium (Mg).....	5.3			
Sodium (Na).....	----------			
Potassium (K).....	5.5			
Bicarbonate (HCO_3).....	235			
Carbonate (CO_3).....	----------			
Alkalinity as $CaCO_3$.....	193			
Sulfate (SO_4).....	7.1			
Chloride (Cl).....	5.6			
Fluoride (F).....	1.1			
Nitrate (NO_3).....	----------			
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	.01			
Dissolved Solids.....	250			
Hardness as $CaCO_3$:				
Total.....	29			
Noncarbonate.....	0			
Specific conductance (micromhos at 25°C)....	320			
Arsenic (As).....	.000			
Barium (Ba).....	.000			
Boron (B).....	.600			
Cadmium (Cd).....	.000			
Chromium (Cr).....	.000			
Cobalt (Co).....	.000			
Copper (Cu).....	.000			
Lead (Pb).....	----------			
Lithium (Li).....	.000			
Mercury (Hg).....	----------			
Strontium (Sr).....	.030			
Zinc (Zn).....	.000			
pH (units).....	8.4			
Temperature (°C).....	----------			

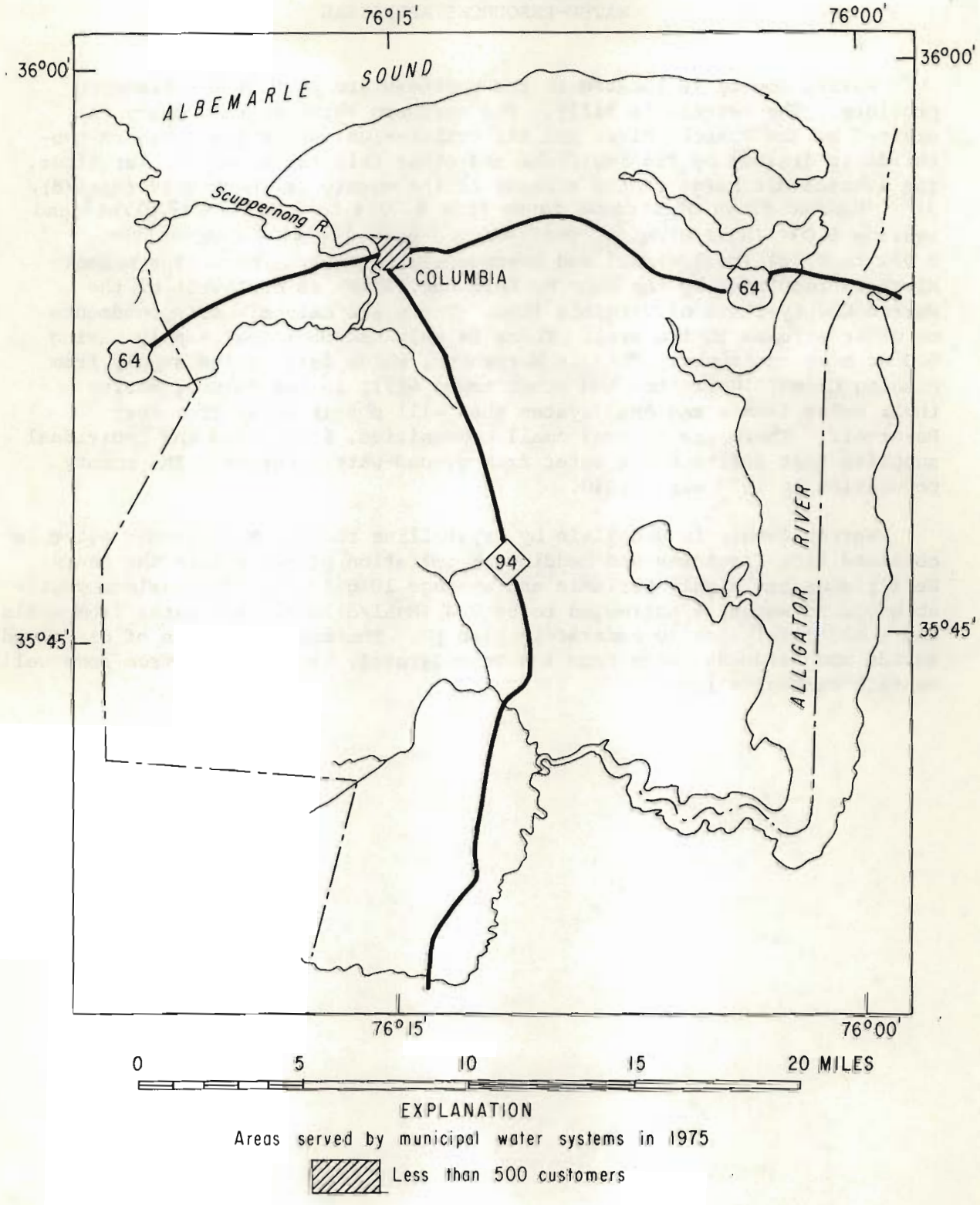
TYRRELL COUNTY

WATER-RESOURCES APPRAISAL

Tyrrell County is located in the east-central part of the Coastal Plain. The county is drained by the Alligator and Scuppernong Rivers and their tributaries. The estuarine parts of these streams are brackish virtually all the time. On the north, the county is bordered by Albemarle Sound, a large body of brackish water. The topography is flat with virtually all of the area being swampland. The average streamflow in the county is estimated at 0.71 (Mgal/d)/mi^2. There are no public water supplies having 500 or more customers. The community of Columbia uses a ground-water source, as do many businesses and individuals. The population of the county in 1970 was 3,806.

The county is underlain by thousands of feet of sedimentary rocks, but only the upper few hundred feet contain fresh water. The depth to salty water varies from greater than 400 feet in the southwestern part of the county to less than 100 feet in the vicinity of the sound. In the southwestern part of the county, the limestone aquifer may be capable of yielding over 1,000 gal/min. Elsewhere in the county, the limestone aquifer contains only salty water. Overlying this aquifer is a sequence of sands and shales belonging to the upper sandy aquifer, which can probably yield hundreds of gallons per minute to individual wells in the southwestern part of the county, but less than 100 gal/min in the vicinity of the sound. The maximum yield of ground water is estimated at 1.0 (Mgal/d)/mi^2. The well water tends to be very hard, alkaline, and may contain excessive iron.

TYRRELL COUNTY



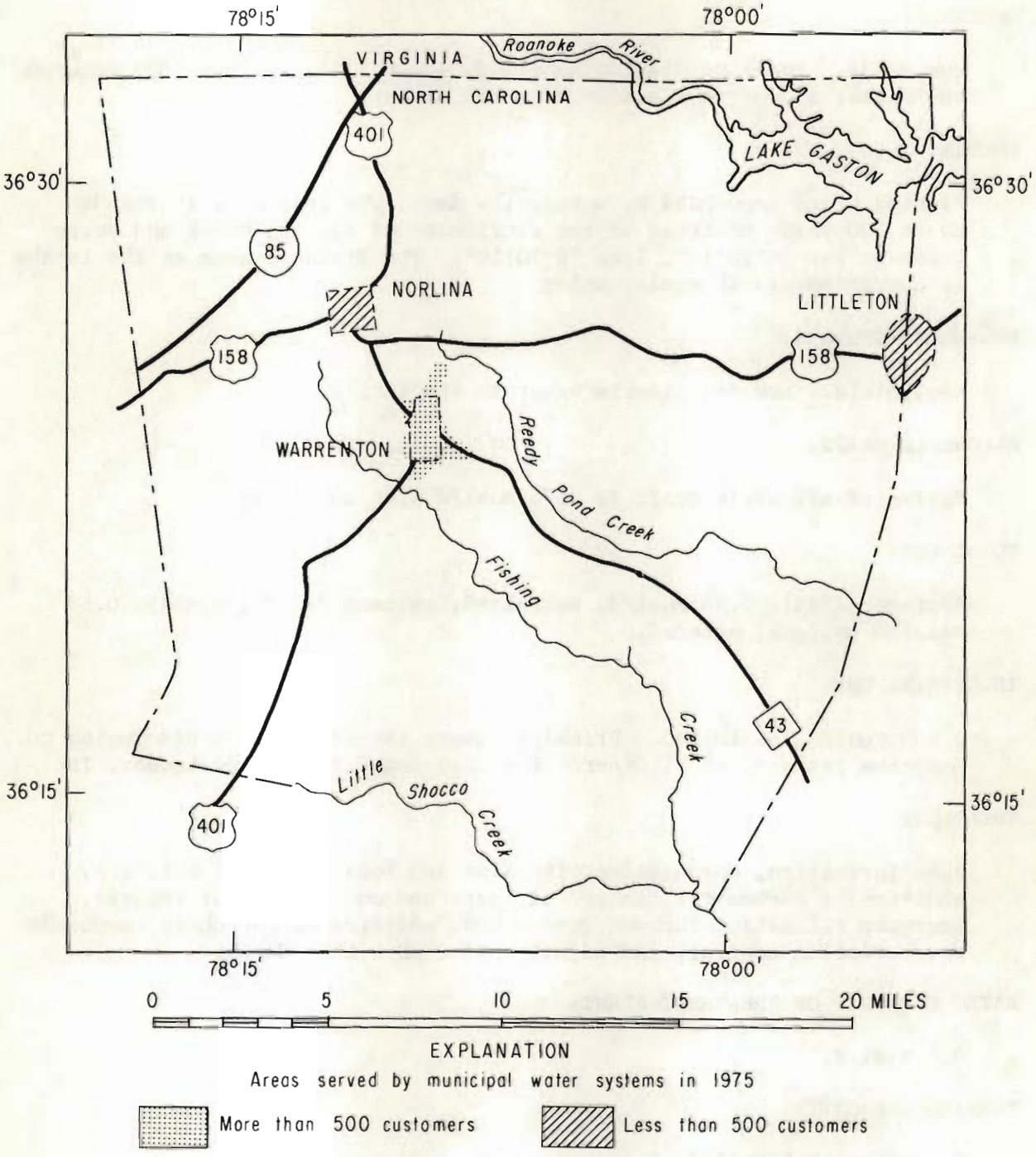
WARREN COUNTY

WATER-RESOURCES APPRAISAL

Warren County is located in the northeastern part of the Piedmont province. The terrain is hilly. The northern third of the county is drained by the Roanoke River and its tributaries, while the southern two-thirds is drained by Fishing Creek and other tributaries of the Tar River. The average discharge of the streams in the county is about 0.78 (Mgal/d)/mi^2. Minimum flows of streams range from 0.0014 to 0.152 (Mgal/d)/mi^2 and average 0.031 (Mgal/d)/mi^2. The 7-day, 2-year low flow ranges from 0.072 to 0.321 (Mgal/d)/mi^2 and averages 0.12 (Mgal/d)/mi^2. The Roanoke River is regulated by the John H. Kerr dam, which is northwest of the Warren County-State of Virginia line. There are only minor impoundments on other streams in the area. There is only one municipal supply having 500 or more customers. This is Warrenton, which derives its supply from Fishing Creek. Warrenton and other towns will, in the future, derive their water from a regional system that will obtain water from Kerr Reservoir. There are several small communities, industries and individual supplies that derive their water from ground-water sources. The county population in 1970 was 15,810.

Warren County is underlain by crystalline rocks. Most ground water is obtained from fractures and bedding or foliation planes within the rocks. Well yields are highly variable and average 18 gal/min. The maximum available ground water is estimated to be 0.4 (Mgal/d)/mi^2. The water from wells has a moderately low to moderately high pH. The concentrations of dissolved solids and hardness range from low to moderately high. Water from some wells contain excessive iron.

WARREN COUNTY



WARRENTON, WARREN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 1,650 in 1974 (820 metered customers, 172 of whom are in suburban areas).

SOURCE:

Fishing Creek impounded by a very low dam. The intake is at the dam about 300 yards upstream of the confluence of Fishing Creek and Horse Creek at lat 36°22'18", long 78°10'10". The drainage area at the intake is approximately 48 square miles.

RAW-WATER STORAGE:

Negligible. Low dam diverts water to the intake.

ALLOWABLE DRAFT:

Estimated allowable draft is 0.75 Mgal/d with no storage.

TOTAL USE:

Average (1974), 0.28 Mgal/d, estimated; maximum daily (9-5-74), 0.58 million gallons, metered.

INDUSTRIAL USE:

0.005 Mgal/d, estimated. Principal users include Peck Manufacturing Co., Cochrane Eastern, Inc., General Box Co., and Carolina Sportswear, Inc.

TREATMENT:

Prechlorination, coagulation with alum and soda ash, sedimentation, addition of carbon for control of taste and odor (added at intake), pressure filtration through graded bed, addition of phosphate compounds for corrosion control, and adjustment of pH with soda ash.

RATED CAPACITY OF TREATMENT PLANT:

0.5 Mgal/d.

PUMPING CAPACITY:

Raw water, 0.6 Mgal/d; finished water, 1.73 Mgal/d.

FINISHED-WATER STORAGE:

One clear well, 100,000 gallons; two elevated tanks 300,000 (emergency use only) and 150,000 gallons.

WARRENTON, WARREN COUNTY

FUTURE PLANS:

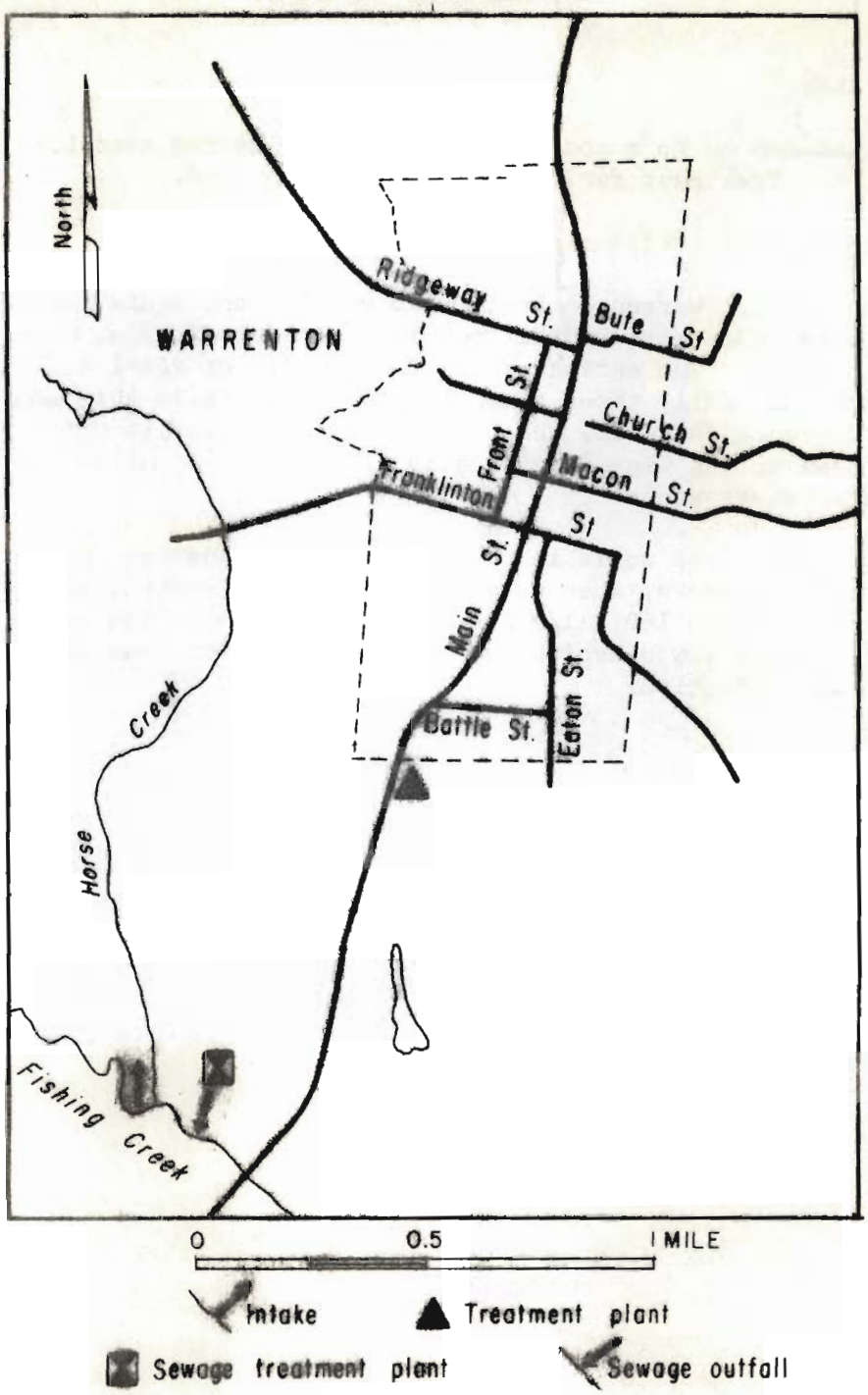
Plan to tap on to a regional water system having Kerr Lake as its source. Treatment facilities will be abandoned.

WATER-RESOURCES APPRAISAL:

Surface water: Warrenton is located west of the center of Warren County. The area in and around the town is drained by Fishing Creek and its tributaries. The estimated allowable draft of Fishing Creek is 0.75 Mgal/d, or nearly three times average use. While this would be adequate for foreseeable needs, the town plans to obtain its water from Kerr Lake, 10 miles to the west, a virtually inexhaustible source considering the town's requirements.

Ground water: The wells in the Warrenton area derive their water from crystalline rocks, such as mica gneiss, mica schist, and granite. Well yields of up to 160 gal/min have been reported. The water tends to be soft, with a low dissolved-solids concentration, but with an excessive iron concentration.

TOWN OF WARRENTON



WARRENTON, WARREN COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Fishing Cr. Raw	Fishing Cr. Finished	Fishing Cr. Raw	Fishing Cr. Finished
Date of collection.....	8-29-66	8-29-66	4- 8-75	4- 8-75
Silica (SiO_2).....	18	17	----------	----------
Iron (Fe).....	.21	.05	.450	.000
Manganese (Mn).....	.01	.01	.060	.020
Calcium (Ca).....	5.6	6.9	----------	----------
Magnesium (Mg).....	1.8	1.3	----------	----------
Sodium (Na).....	5.9	24	----------	----------
Potassium (K).....	2.1	2.3	----------	----------
Bicarbonate (HCO_3).....	34	59	----------	----------
Carbonate (CO_3).....	0	0	----------	----------
Alkalinity as $CaCO_3$.....	28	48	----------	----------
Sulfate (SO_4).....	2.4	15	----------	----------
Chloride (Cl).....	4.5	9.0	3.2	4.7
Fluoride (F).....	.0	.0	----------	----------
Nitrate (NO_3).....	.5	.2	----------	----------
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	63	105	----------	----------
Hardness as $CaCO_3$:				
Total.....	21	22	----------	----------
Noncarbonate.....	0	0	----------	----------
Specific conductance (micromhos at 25°C)....	73	156	55	107
Arsenic (As).....	----------	----------	.000	.000
Barium (Ba).....	----------	----------	.030	.020
Boron (B).....	----------	----------	.001	.005
Cadmium (Cd).....	----------	----------	.001	.000
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.000	.000
Copper (Cu).....	----------	----------	.027	.005
Lead (Pb).....	----------	----------	.000	.001
Lithium (Li).....	----------	----------	.000	.000
Mercury (Hg).....	----------	----------	.0002	.0
Strontium (Sr).....	----------	----------	.090	.080
Zinc (Zn).....	----------	----------	.010	.010
pH (units).....	6.8	7.8	----------	----------
Temperature (°C).....	20	----------	----------	----------

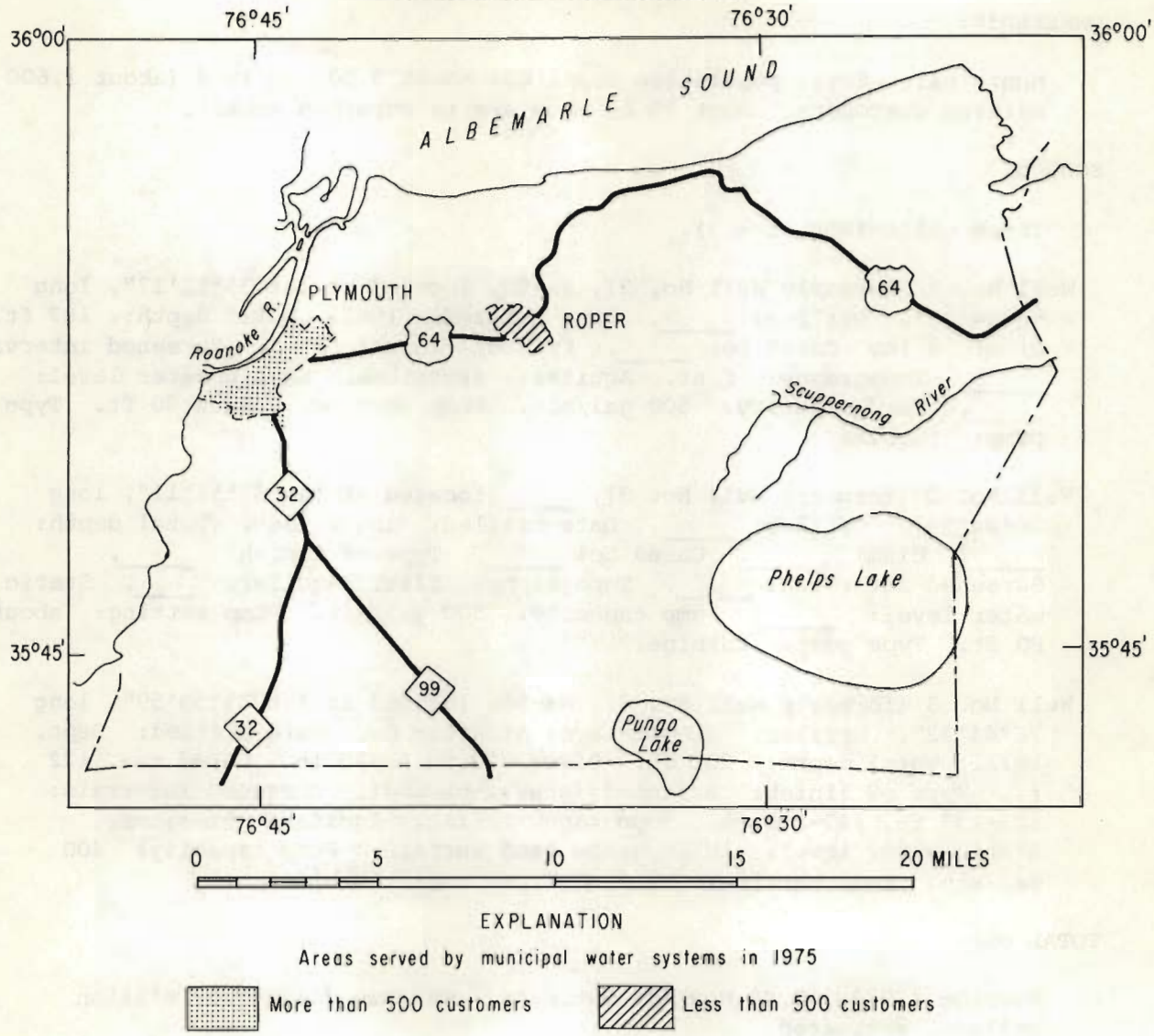
WASHINGTON COUNTY

WATER-RESOURCES APPRAISAL

Washington County is located in the east-central Coastal Plain of North Carolina. It is drained by the Roanoke and Scuppernong Rivers and their tributaries. It is bounded on the north by Albemarle Sound. The sound and its estuaries are brackish much of the time. Phelps Lake and Pungo Lake lie mostly within the county and have capacities of 26.1 and 2.75 billion gallons, respectively. The county has a low, flat topography and is largely swampland. There has been considerable drainage of the swampland for agriculture. The average discharge of streams is estimated at 0.71 $(Mgal/d)/mi^2$. Most of the non-estuarine streams go dry in drought. The only public water supply in the county having 500 or more customers is at Plymouth. This supply is derived from ground water as are the other community and private supplies in the county. The county population in 1970 was 14,038.

Although the county is underlain by thousands of feet of sedimentary deposits, only the upper few hundred feet of these deposits contain fresh water. The depth to salty water varies from greater than 400 feet in the southern half of the county to less than 100 feet in the immediate vicinity of the sound. The county is immediately underlain by the upper sandy aquifer, which has a thickness of 100 to 400 feet. Where these deposits are thickest, and the depth to salty water is greatest, these deposits could yield up to 1,000 gal/min of fresh water to individual wells. The limestone aquifer, which underlies the sands and shales is capable of yielding thousands of gallons of fresh water per minute to wells, except in the northern third of the county where it contains little or no fresh water. The maximum ground-water yield is estimated at 1.0 $(Mgal/d)/mi^2$. The ground water is characteristically very hard and may contain excessive iron. In places, water from the limestone aquifer may contain hydrogen sulfide.

WASHINGTON COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

Less than 500 customers

PLYMOUTH, WASHINGTON COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 5,000 in 1964 (about 1,600 metered customers, about 10 of whom are in suburban areas).

SOURCE:

Three wells (Nos. 1 - 3).

Well No. 1 (formerly Well No. 2), Ws-85, located at lat 35°51'17", long 76°44'38". Driller: _____. Date drilled: 1961. Total depth: 187 ft. Diam: 8 in. Cased to: _____. Type of finish: _____. Screened intervals: _____. Topography: flat. Aquifer: limestone. Static water level: _____. Pump capacity: 500 gal/min. Pump setting: about 80 ft. Type pump: turbine.

Well No. 2 (formerly Well No. 3), _____ located at lat 35°51'11", long 76°44'34". Driller: _____. Date drilled: about 1968. Total depth: _____. Diam: _____. Cased to: _____. Type of finish: _____. Screened intervals: _____. Topography: flat. Aquifer: _____. Static water level: _____. Pump capacity: 500 gal/min. Pump setting: about 80 ft. Type pump: turbine.

Well No. 3 (formerly Well No. 4), Ws-86, located at lat 35°50'59", long 76°44'32". Driller: Singer-Layne Atlantic Co. Date drilled: Sept. 1971. Total depth: 202 ft. Diam: 20 in to 10 in. Cased to: 122 ft. Type of finish: screened (gravel-packed). Screened intervals: 122-137 ft, 140-155 ft. Topography: flat. Aquifer: limestone. Static water level: 10 ft below land surface. Pump capacity: 400 gal/min. Pump setting: 75 ft. Type pump: turbine.

TOTAL USE:

Average (1974), 0.43 Mgal/d, estimated; maximum daily 0.67 million gallons, estimated.

INDUSTRIAL USE:

None.

TREATMENT:

Aeration, zeolite process for softening, chlorination.

RATED CAPACITY OF TREATMENT PLANT:

2.2 Mgal/d.

PLYMOUTH, WASHINGTON COUNTY

PUMPING CAPACITY:

2.0 Mgal/d.

RAW-WATER STORAGE:

None.

FINISHED-WATER STORAGE:

One clear well, 75,000 gallons; two elevated tanks, 500,000 and 250,000 gallons.

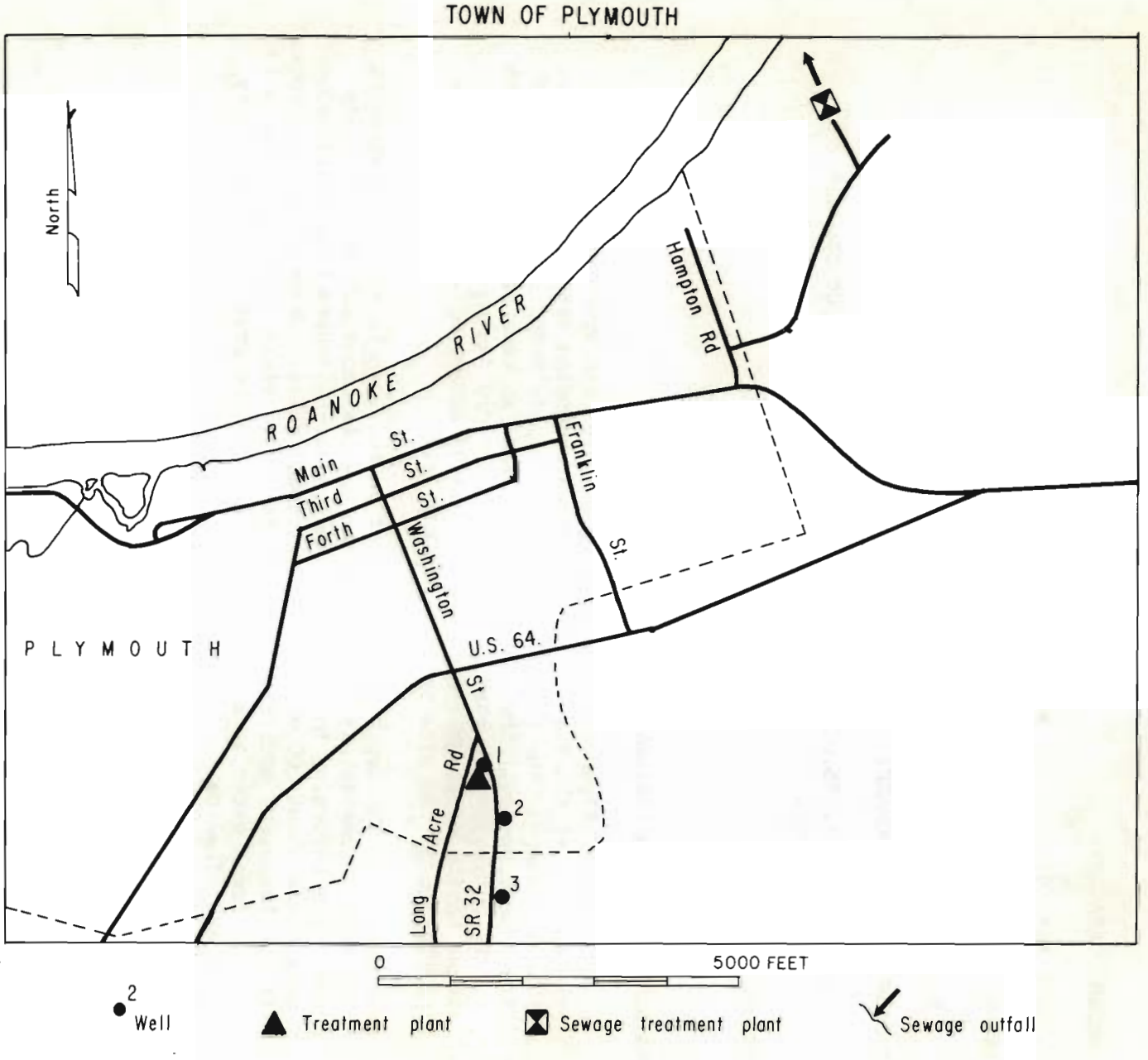
FUTURE PLANS:

None.

WATER-RESOURCES APPRAISAL:

Surface water: Plymouth is located in northwestern Washington County on the estuary of the Roanoke River. The surrounding area is flat and, in places, swampy. The Roanoke River could supply water far in excess of the town's needs if the water were not brackish much of the time. Most of the non-estuarine streams in the area go dry during drought, even those having drainage areas greater than 25 square miles. The average streamflow in the area is 0.71 (Mgal/d)/mi^2.

Ground water: The depth to salty water in the town is estimated at about 250 feet. Immediately underlying the town is about 110 feet of sands and clays belonging to the upper sandy aquifer. These beds could probably yield about 100 gal/min to individual wells. Underlying these rocks is the limestone aquifer. This aquifer could yield more than 1,000 gal/min of fresh water to a well. Well water in the area tends to be very hard and alkaline.


TOWN OF PLYMOUTH
North
ROANOKE RIVER
Hampton Rd
Main St.
Third St.
Forth St.
Washington St.
Franklin St.
PLYMOUTH
U.S. 64.
1
2
3
Long Acre Rd
SR 32
0
5000 FEET
Well
Treatment plant
Sewage treatment plant
Sewage outfall

PLYMOUTH, WASHINGTON COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw;finished)...	Well No. 1 Raw	Well No. 1 Finished	Wells 1-3[a] Raw	Wells 1-3[a] Finished
Date of collection.....	6-20-66	6-20-66	8- 7-74	8- 7-74
Silica (SiO2).....	38	30	----------	39
Iron (Fe).....	.13	.03	.260	.010
Manganese (Mn).....	.01	.01	.020	.020
Calcium (Ca).....	61	16	----------	33
Magnesium (Mg).....	41	7.5	----------	29
Sodium (Na).....	137	244	----------	170
Potassium (K).....	22	42	----------	26
Bicarbonate (HCO3).....	381	358	----------	376
Carbonate (CO3).....	0	4	----------	0
Alkalinity as CaCO3.....	312	----------	----------	308
Sulfate (SO4).....	23	22	----------	16
Chloride (Cl).....	225	232	190	200
Fluoride (F).....	6	.6	----------	1.0
Nitrate (NO3).....	.1	.3	----------	----------
Nitrite + Nitrate as Nitrogen (NO2 + NO3 as N).....	----------	----------	----------	.86
Dissolved Solids.....	735	784	----------	704
Hardness as CaCO3:				
Total.....	321	70	----------	200
Noncarbonate.....	9	0	----------	0
Specific conductance (micromhos at 25°C)....	1230	1380	1100	1200
Arsenic (As).....	----------	----------	.000	.000
Barium (Ba).....	----------	----------	.000	.000
Boron (B).....	----------	----------	.300	.400
Cadmium (Cd).....	----------	----------	.000	.000
Chromium (Cr).....	----------	----------	.000	.000
Cobalt (Co).....	----------	----------	.003	.003
Copper (Cu).....	----------	----------	.000	.002
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	.037	.042
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	.820	.430
Zinc (Zn).....	----------	----------	.007	.000
pH (units).....	8.1	8.3	----------	7.6
Temperature (°C).....	17	----------	----------	----------

[a] Composite sample.

WILSON COUNTY

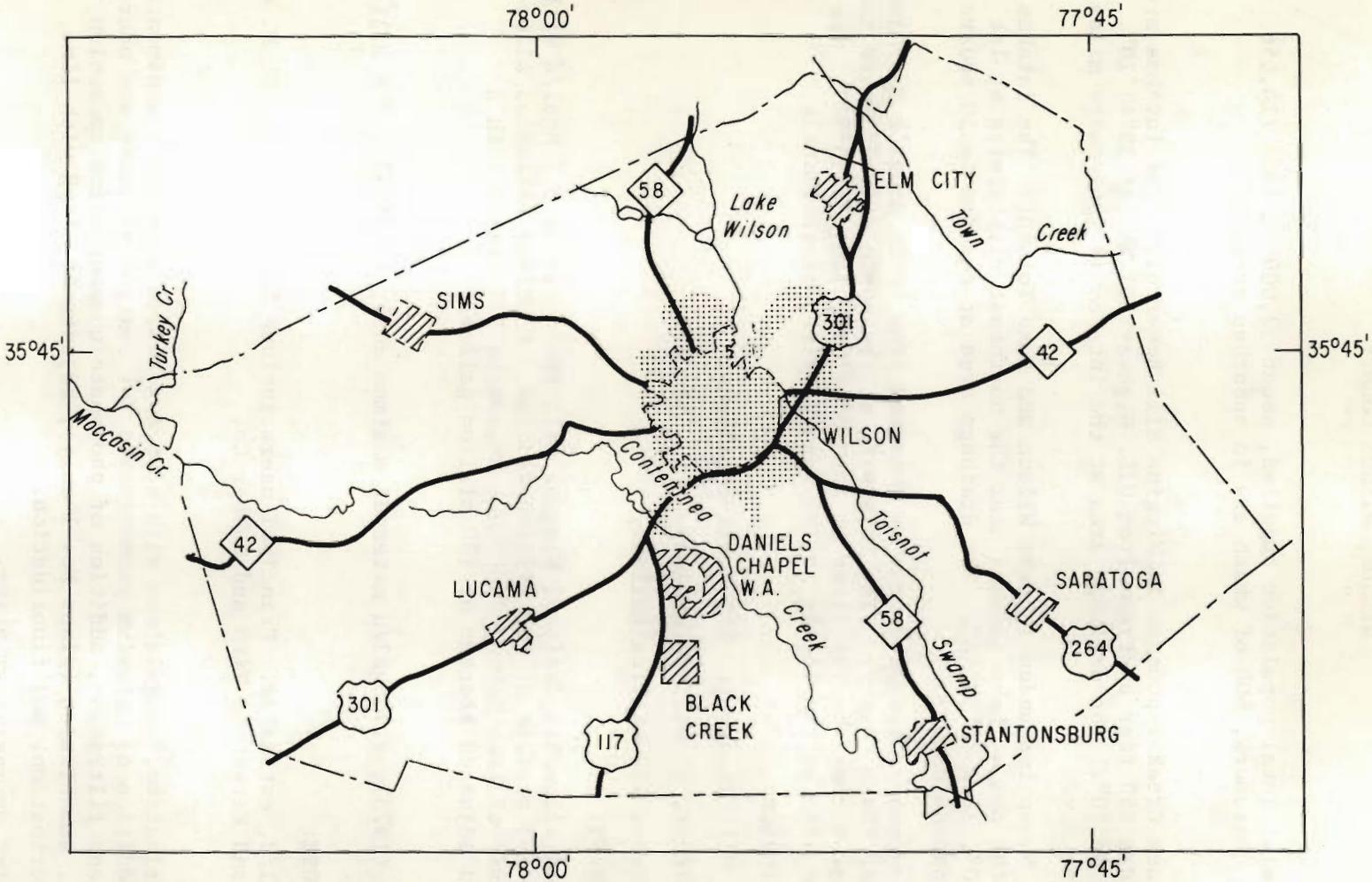
WATER-RESOURCES APPRAISAL

The eastern two-thirds of Wilson County lies within the central Coastal Plain in east-central North Carolina while the western third lies within the Piedmont region. The topography is flat to gently rolling. Stream valleys tend to be swampy. All of the county except the northeastern part is drained by Contentnea Creek and its tributaries. Contentnea Creek is itself a tributary of the Neuse River. The northeastern fifth of the county is drained by Town Creek and its tributaries. Town Creek flows to the Tar River. The average discharge of streams varies from 0.65 to 0.84 $(Mgal/d)/mi^2$. Minimum flows range from 0 to 0.005 $(Mgal/d)/mi^2$ and average 0.007 $(Mgal/d)/mi^2$. The 7-day, 2-year low flow ranges from 0.0023 to 0.13 $(Mgal/d)/mi^2$. Except for a few minor impoundments, the streams in the county are unregulated.

The county is underlain by clayey deposits belonging to the upper sandy aquifer, which, here and there, may enclose thin, discontinuous beds of sand or gravel. East of an imaginary line through Elm City, Wilson, and Lucama, these deposits are underlain by the eastward-thickening lower sandy aquifer. Where thin, the lower sandy aquifer, as well as the overlying upper sandy aquifer, yield little water to wells. At the eastern edge of the county, the lower sandy aquifer reaches a thickness of 180 feet and may yield up to 500 gal/min to a properly constructed well. These aquifers are underlain by crystalline rocks. Wells in the crystalline rocks have a wide range in yields, but low yields predominate. Reported yields from 220 wells range from 0 to 600 gal/min. Commonly, well yields of 50 gal/min can be obtained in interstream areas, while yields of 125 gal/min can be obtained in stream valleys and other favorable areas. The maximum ground-water yield in the county is estimated at 0.7 $(Mgal/d)/mi^2$. However, the maximum possible recharge to the lower sandy aquifer is estimated at 0.007 $(Mgal/d)/mi^2$.

The ground water tends to be soft to slightly hard with a moderate dissolved-solids concentration and a slightly acidic pH. Excessive iron concentrations are common. At some localities in eastern Wilson County, wells in the lower sandy aquifer or crystalline rocks may yield water having an excessive chloride concentration.

WILSON COUNTY



EXPLANATION

Areas served by municipal water systems in 1975

More than 500 customers

Less than 500 customers

WILSON, WILSON COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 32,000 in 1974 (10,056 metered customers, 600 of which are in suburban areas).

SOURCES:

Contentnea Creek impounded in Wiggins Mill Reservoir: The intakes are at the dam 250 feet upstream from U.S. Highway 301 at lat 35°41'10", long 77°56'50". The drainage area at the intakes is 236 square miles, approximately.

Toisnot Swamp impounded in Lake Wilson and Lake Toisnot: The intakes are at the dam at Lake Toisnot near the northeast city limits at lat 35°44'30", long 77°53'50". The drainage area at the dam is 50 square miles, approximately.

In an emergency, raw water can be obtained from Rocky Mount's Tar River Reservoir (Nash County). The intake is at the south side of State Road 58 bridge across the Tar River at lat 35°50'55", long 77°55'51". The drainage area at the intake is 701 square miles, approximately.

RAW-WATER STORAGE:

Wiggins Mill Reservoir, 525 million gallons.

Lake Toisnot, 35 million gallons.

Lake Wilson, 119 million gallons.

ALLOWABLE DRAFT:

Estimated allowable draft of Wiggins Mill Reservoir is 3.2 Mgal/d with an adjusted storage of 400 million gallons. Combined estimated allowable draft of Lake Toisnot and Lake Wilson is 5.2 Mgal/d with a combined adjusted storage of 130 million gallons.

TOTAL USE:

Average (1973), 4.7 Mgal/d metered; maximum daily (7-26-72), 7.6 million gallons.

INDUSTRIAL USE:

1.5 Mgal/d, estimated. Principal users include Swift and Co., G. N. C. Corp., and Firestone Tire and Rubber Co.

TREATMENT:

Prechlorination, coagulation with alum and sodium aluminate, sedimentation, addition of potasium permanganate for control of taste and odor, rapid sand filtration, addition of phosphate compounds for corrosion control, ammoniation (plant No. 1 only), adjustment of pH with lime, postchlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

Plant No. 1, 6 Mgal/d; Plant No. 2, 4 Mgal/d.

WILSON, WILSON COUNTY

PUMPING CAPACITY:

Plant No. 1: Raw water, 5.2 Mgal/d; finished water, 7.9 Mgal/d.

Plant No. 2: Raw water, 6.7 Mgal/d; finished water, 6.0 Mgal/d.

FINISHED-WATER STORAGE:

Two clear wells, 2,000,000 and 1,000,000 gallons; two elevated tanks, each of 1,000,000 gallons.

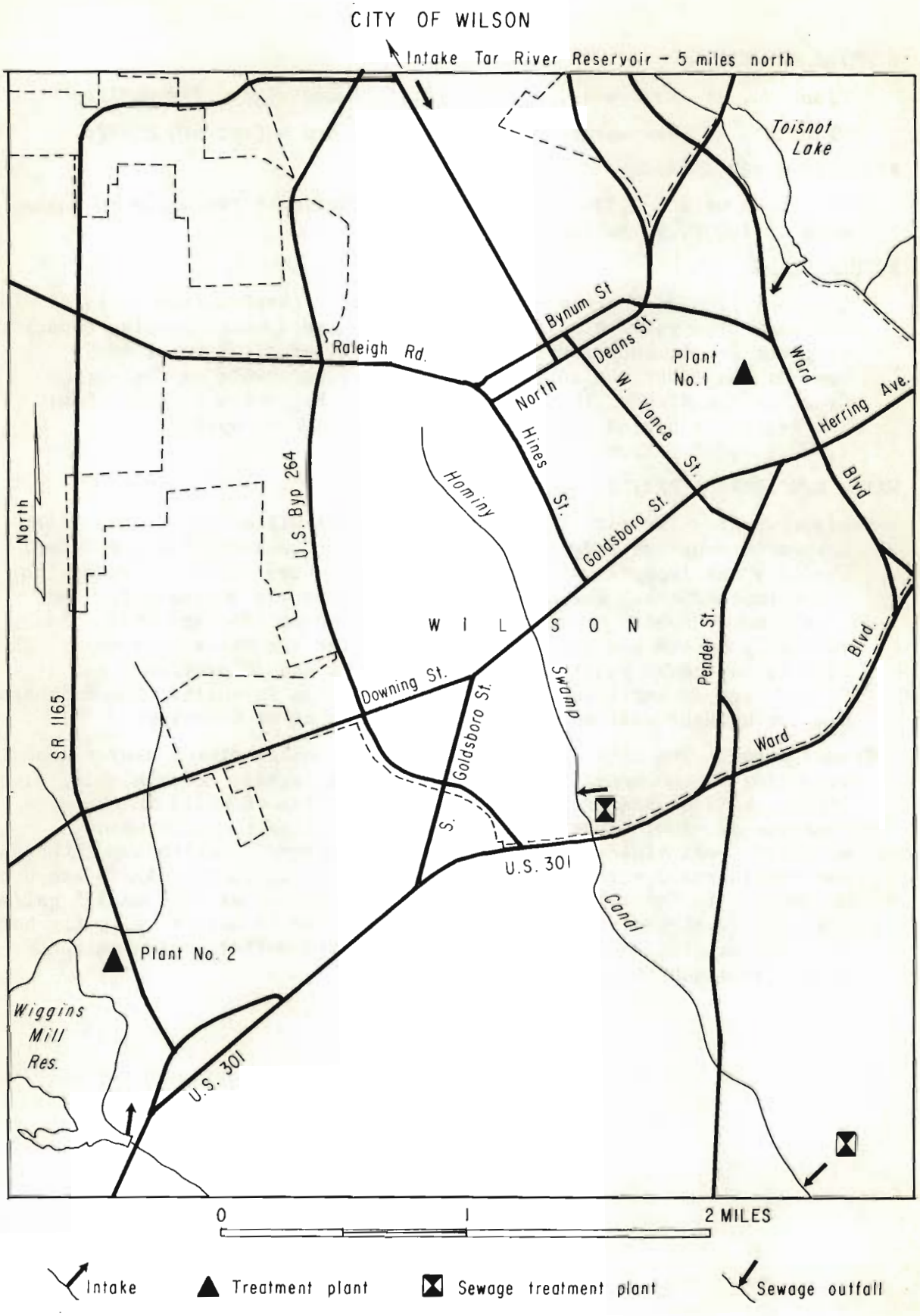
FUTURE PLANS:

A one-million gallon elevated tank was under construction in 1974. In the next five years plan to: increase finished water pumping capacity at plant No. 1; increase treatment capacity at plant No. 2 to 16 Mgal/d; and construct an interim raw water reservoir on Contentnea Creek at the site of the proposed Corps of Engineers Buckhorn Dam. The reservoir behind the interim dam will have a capacity of 1,000,000,000 gallons.

WATER-RESOURCES APPRAISAL:

Surface water: The city is located in central Wilson County on a flat-topped interstream ridge between Contentnea Creek and Toisnot Swamp. The city has impoundments on both of these water courses. Even with these impoundments, the allowable draft is barely adequate for the city's water needs. Water use was curtailed in 1968 and 1973. An emergency intake has been constructed on the Tar River Reservoir. The interim dam to be built on Contentnea Creek should provide a satisfactory supply until the proposed Buckhorn Dam is built. The Buckhorn Dam impoundment will meet any foreseeable need of the city.

Ground water: The city of Wilson is directly underlain by clayey deposits belonging to the upper sandy aquifer, which locally contain thin, discontinuous beds of sand or gravel. Typical yields of wells in these deposits are low. Crystalline bedrock underlies the upper sandy aquifer. Well yields in the bedrock are extremely variable. Although many wells yield virtually nothing, yields of 20 to 50 gal/min are not uncommon. In favorable locations, well yields of as much as 125 gal/min could be developed. The ground water tends to be soft to slightly hard, slightly acidic, and has a moderate dissolved-solids concentration. Water containing excessive iron is common.


CITY OF WILSON
Intake Tar River Reservoir – 5 miles north
Toisnot Lake
Bynum St
Raleigh Rd.
Deans St.
Plant No. 1
Ward Blvd.
Herring Ave.
North Hines St.
W. Vance St.
Hominy
U.S. Byp 264
North
Goldsboro St.
W I L S O N
Pender St.
Swamp
Downing St.
SR 1165
Goldsboro St.
S.
Ward Blvd.
U.S. 301
Canal
Plant No. 2
Wiggins Mill Res.
U.S. 301
0
1
2 MILES
Intake
Treatment plant
Sewage treatment plant
Sewage outfall

WILSON, WILSON COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished).....	Toisnot Swp. Impounded Raw	Toisnot Swp. Impounded Finished	Wiggins Mill Reservoir Raw	Wiggins Mill Reservoir Finished
Date of collection.....	3-28-66	3-28-66	3-28-66	3-28-66
Silica (SiO_2).....	2.6	3.2	6.6	7.0
Iron (Fe).....	.00	.02	.21	.00
Manganese (Mn).....	.02	.03	.02	.01
Calcium (Ca).....	3.4	10	3.5	10
Magnesium (Mg).....	.6	1.7	1.0	.9
Sodium (Na).....	4.2	5.8	4.6	6.0
Potassium (K).....	.8	.9	1.1	1.1
Bicarbonate (HCO_3).....	10	17	15	21
Carbonate (CO_3).....	0	0	0	0
Alkalinity as $CaCO_3$.....	8	14	12	17
Sulfate (SO_4).....	6.4	16	4.8	15
Chloride (Cl).....	6.7	10	5.5	8.1
Fluoride (F).....	.1	1.0	.1	1.0
Nitrate (NO_3).....	.2	.4	.3	.1
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N).....	----------	----------	----------	----------
Dissolved Solids.....	37	58	47	60
Hardness as $CaCO_3$:				
Total.....	12	33	14	30
Noncarbonate.....	4	19	1	13
Specific conductance (micromhos at 25°C)....	51	105	51	97
Arsenic (As).....	----------	----------	----------	----------
Barium (Ba).....	----------	----------	----------	----------
Boron (B).....	----------	----------	----------	----------
Cadmium (Cd).....	----------	----------	----------	----------
Chromium (Cr).....	----------	----------	----------	----------
Cobalt (Co).....	----------	----------	----------	----------
Copper (Cu).....	----------	----------	----------	----------
Lead (Pb).....	----------	----------	----------	----------
Lithium (Li).....	----------	----------	----------	----------
Mercury (Hg).....	----------	----------	----------	----------
Strontium (Sr).....	----------	----------	----------	----------
Zinc (Zn).....	----------	----------	----------	----------
pH (units).....	6.0	7.2	6.3	6.9
Temperature (°C).....	13	----------	13	----------

WILSON, WILSON COUNTY

ANALYSES
(In milligrams per liter, except as noted)

Source, or type of water (raw; finished) Date of collection	Wiggins Mill Reservoir Raw 6- 6-74	Wiggins Mill Reservoir Finished 6- 6-74		
Silica (SiO_2)	----------	----------		
Iron (Fe)	.760	.020		
Manganese (Mn)	.100	.230		
Calcium (Ca)	----------	----------		
Magnesium (Mg)	----------	----------		
Sodium (Na)	----------	----------		
Potassium (K)	----------	----------		
Bicarbonate (HCO_3)	----------	----------		
Carbonate (CO_3)	----------	----------		
Alkalinity as $CaCO_3$	----------	----------		
Sulfate (SO_4)	----------	----------		
Chloride (Cl)	5.1	7.7		
Fluoride (F)	----------	----------		
Nitrate (NO_3)	----------	----------		
Nitrite + Nitrate as Nitrogen (NO_2 + NO_3 as N)	----------	----------		
Dissolved Solids	----------	----------		
Hardness as $CaCO_3$:				
Total	----------	----------		
Noncarbonate	----------	----------		
Specific conductance (micromhos at 25°C)	58	116		
Arsenic (As)	.002	.003		
Barium (Ba)	.000	.000		
Boron (B)	.050	.010		
Cadmium (Cd)	.003	.009		
Chromium (Cr)	.000	.000		
Cobalt (Co)	.001	.001		
Copper (Cu)	.320	.029		
Lead (Pb)	.006	.010		
Lithium (Li)	.000	.000		
Mercury (Hg)	.0002	.0001		
Strontium (Sr)	.000	.000		
Zinc (Zn)	.080	.040		
pH (units)	----------	----------		
Temperature (°C)	----------	----------		

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Civil Engineering Department
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Durham,
North Carolina 27706

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University of North Carolina
Chapel Hill, N. C. 27514

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660 West Fifth Street
Winston-Salem,
North Carolina 27101

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P. O. Box 3725
Wilmington, N. C. 28401

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Univ. of N. C. at Charlotte
UNCC Station
Charlotte N. C. 28223

Z. Smith Reynolds Library
Wake Forest University
Winston-Salem,
North Carolina 27109

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Elizabeth City,
North Carolina 27909

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Henderson, N. C. 27536

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Multi-county Planning Region Q
Mid-East Commission
137 Seaboard Bldg., N. Market St.
P. O. Box 1218
Washington, N. C. 27889

Executive Director
Multi-county Planning Region L
Region L Council of Governments
301 Bypass South, P.O. Drawer 2748
Rocky Mount, N. C. 27801

Executive Director
Multi-county Planning Region R
Albemarle Reg. Pl. & Dev. Comm.
102 E. Queen Street
P. O. Box 587
Edenton, N. C. 27932

Executive Director
Multi-county Planning Region P
Neuse River Council of Governments
1404 Neuse Boulevard. P.O. Box 1717
New Bern, N. C. 28560

Bay River Soil & Water Conservation District
Pamlico County
P. O. Box 1430
New Bern,
North Carolina 28560

Northeastern Albemarle Conservation District
Box 299
Edenton, N. C. 27932

Beaufort Soil & Water Conservation District
P. O. Box 767
Washington, N. C. 27889

Bertie Soil & Water Conservation District
P. O. Box 566
Windsor, N. C. 27983

Camden County of the Albemarle SWCD
P. O. Box 38
Camden, N. C. 27921

Currituck County of the Albemarle SWCD
P. O. Box 69
Currituck, N. C. 27929

Dare County of the Pamlico SWCD
P. O. Box 1057
Manteo, N. C. 27954

Edgecombe Soil & Water Conservation District
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Tarboro, N. C. 27886

Fishing Creek Soil & Water Conservation District
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Halifax, N. C. 27839

Franklin Soil & Water Conservation District
307 East Nash Street
Louisburg, N. C. 27549

Gates Soil & Water Conservation District
P. O. Box 61
Gatesville, N. C. 27938

Hertford Soil & Water Conservation District
P. O. Box 265
Winton, N. C. 27986

Hyde County of the Pamlico SWCD
P. O. Box 264
Swan Quarter, N. C. 27885

Martin Soil & Water Conservation District
P. O. Box 483
Williamston, N. C. 27892

Nash Soil & Water Conservation District
1006 Eastern Avenue
Nashville, N. C. 27856

Northampton Soil & Water Conservation District
P. O. Box 218
Jackson, N. C. 27845

Pasquotank County of the Albemarle SWCD
P. O. Box 604
Elizabeth City, N. C. 27909

Perquimans County of the Albemarle SWCD
P. O. Box 198
Hertford, N. C. 27944

Pitt Soil & Water Conservation District
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Greenville, N. C. 27834

Tyrrell County of the Pamlico SWCD
P. O. Box 162
Columbia, N. C. 27925

Warren Soil & Water Conservation District
P. O. Box 446
Warrenton, N. C. 27589

Washington County of the Pamlico SWCD
P. O. Box 863
Plymouth, N. C. 27962

Wilson Soil & Water Conservation District
P. O. Box 3066
Wilson, N. C. 27893

City Officials

Mr. Dan Adams
Water Plant Superintendent
Town of Belhaven
City Hall
Belhaven, N. C. 27810

Mr. Jerry Cutler
Water Plant Superintendent
City of Washington
P. O. Box 850, Market Street
Washington, N. C. 27889

Mr. Kelly Hoggard
Water Plant Superintendent
Town of Windsor
P. O. Box 508, 128 S. King Street
Windsor, N. C. 27983

Mr. Jimmy Patterson
Water Plant Superintendent
Town of Edenton
P. O. Box 300
South Broad Street
Edenton, N. C. 27932

Mr. Danny McPherson
Water Plant Superintendent
Town of Kill Devil Hills
P. O. Box 719
Kill Devil Hills,
North Carolina 28501

Mr. John Richeson
Water Plant Superintendent
Town of Nags Head
P. O. Box 95
Nags Head,
North Carolina 27959

Mr. Bruce Dunn
Director of Public Works
Town of Pinetops
P. O. Drawer C
Hamlet Street
Pinetops, N. C. 27864

Mr. Virgil Truitt
Water Plant Superintendent
Town of Tarboro
P. O. Box 220
500 Main Street
Tarboro, N. C. 27886

Mr. Milton D. Hayes
Director of Public Works
Town of Franklinton
P. O. Box 308
West Mason Street
Franklinton, N. C. 27525

Mr. Michael Hicks
Water Plant Superintendent
Town of Louisburg
110 West Nash Street
Louisburg,
North Carolina 27549

Mr. Julius G. Woody
Town Clerk
Town of Enfield
P. O. Box 87
Railroad Street
Enfield, N. C. 27823

Mr. Ben Lancaster
Water Plant Superintendent
City of Roanoke Rapids
P. O. Box 38
Roanoke Avenue
Roanoke Rapids, N. C. 27870

Mr. S. R. Williams
Director of Public Works
Town of Scotland Neck
P. O. Box 156
East 11th Street
Scotland Neck, N. C. 27874

Mr. Charles B. Fritts
Water Plant Superintendent
Town of Weldon
P. O. Box 551
111 Washington Avenue
Weldon, N. C. 27890

Mr. Robert C. Elliot
Town Manager
Town of Ahoskie
P. O. Box 767
301 West Main Street
Ahoskie, N. C. 27910

Mr. J. J. Beatty
Director of Public Works
Town of Murfreesboro
P. O. Box 6
105 East Broad Street
Murfreesboro, N. C. 27855

Mr. Harold D. Pittman
Water Plant Superintendent
Town of Nashville
P. O. Box 987
111 North Boddie Street
Nashville, N. C. 27856

Mr. Charles D. Mercer
Water Plant Superintendent
City of Elizabeth City
P. O. Box 347
300 East Colonial Avenue
Elizabeth City, N. C. 27909

Mr. Walter Gray
Water Plant Superintendent
Town of Bethel
P. O. Box 337
James Street
Bethel, N. C. 27812

Mr. Doug Quinn
Director of Public Works
Town of Grifton
P. O. Box 598
West Queen Street
Grifton, N. C. 28530

Mr. W. H. Thomas
Water Plant Superintendent
Town of Plymouth
P. O. Box 806
132 East Water Street
Plymouth,
North Carolina 27962

Mr. J. S. Simpson
Director of Public Works
Town of Robersonville
P. O. Box 487
Main Street
Robersonville, N. C. 27871

Mr. James Edward Parrish
Water Plant Superintendent
City of Rocky Mount
P. O. Box 1180
131-139 N. E. Main Street
Rocky Mount, N. C. 27801

Mr. F. T. Britt
Water Plant Superintendent
Town of Hertford
P. O. Box 32
114 West Grubb Street
Hertford, N. C. 27944

Mr. Johnny Thorne
Water Plant Superintendent
Town of Farmville
P. O. Box 86
124 North Main Street
Farmville, N. C. 27828

Mr. Alton Hines
Water Plant Superintendent
Town of Winterville
P. O. Box 431
105 North Railroad Street
Winterville, N. C. 28590

Mr. Bruce Martin &
Mr. Walter Baker
Water Plant Superintendents
City of Wilson
P. O. Box 10
Goldsboro Street
Wilson, N. C. 27893 (2)

Mr. Robert Gurganus
Water Plant Superintendent
Town of Williamston
P. O. Box 506
East Main Street
Williamston, N. C. 27892

Mr. James R. Collie
Director of Public Works
Town of Spring Hope
P. O. Box 87
118 West Railroad Street
Spring Hope, N. C. 27882

Mr. Elmer Kornegay
Water Plant Superintendent
Town of Ayden
P. O. Box 217
221 West Avenue
Ayden, N. C. 28513

Mr. Wadie Lewis
Water Plant Superintendent
City of Greenville
P. O. Box 1905
201 West Fifth Street
Greenville, N. C. 27834

Mr. W. B. Neal
Water Plant Superintendent
Town of Warrenton
P. O. Box 281
Market & Bragg Street
Warrenton, N. C. 27589

Cape Hatteras Water Association
Buxton,
North Carolina 27920

County Managers or County Accountants

Mr. J. M. Hodges, Jr.
Beaufort County Finance Officer
P. O. Box 1027
Washington, N. C. 27889

Mr. Dallas Jethro, Jr.
Chowan County Coordinator
County Office Building
Edenton, N. C. 27932

Mr. Allen Lee Harrell
Edgecombe County Manager
P. O. Box 10
Tarboro, N. C. 27886

Mr. Roy Lee Ferrell
Halifax County Manager
County Courthouse
Halifax, N. C. 27939

Mr. Kenneth Daniels
Martin County Finance Officer
County Courthouse
Williamston, N. C. 27802

Mr. John K. Priester
Pamlico County Finance Officer
P. O. Box 186
Bayboro, N. C. 28515

Mr. John Ed Whitehurst
Bertie County Manager
County Courthouse
Windsor, N. C. 27983

Mr. Graham Pervier
Currituck County Manager
County Courthouse
Currituck, N. C. 27929

Mr. Lewis Dunn
Franklin County Manager
113 Market Street
Louisburg, N. C. 27549

Mr. Wayne Deal
Hertford County Manager
P. O. Box 116
Winton, N. C. 27986

Mr. L. R. Holoman, Jr.
Nash County Manager
County Courthouse
Nashville, N. C. 27856

Mr. J. Michael Thomas
Pasquotank County Coordinator
P. O. Box 272
Elizabeth City, N. C. 27909

Ms. Kathleen S. Cherry
Camden County Finance Officer
County Courthouse
Camden, N. C. 27921

Mr. Jack Cahoon
Dare County Manager
County Courthouse
Manteo, N. C. 27954

Mr. Edward C. McDuffie
Gates County Manager
Gatesville,
North Carolina 27938

Mr. Clifford Swindell
Hyde County Coordinator
County Courthouse
Swan Quarter, N. C. 27885

Mr. Sidney T. Ellen
Northampton County Manager
County Courthouse
Jackson, N. C. 27845

Mr. D. F. Reed, Jr.
Perquimans County Finance Officer
P. O. Box 196
Hertford, N. C. 27944

Mr. H. Reginald Gray
Pitt County Manager
P. O. Box A
Greenville, N. C. 27834

Mr. Bill Hartman
Washington County Manager
County Courthouse
Plymouth, N. C. 27962

Mr. Ray McClees
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P. O. Box 121
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Mr. R. L. Shuford
Wilson County Manager
P. O. Box 1228
Wilson, N. C. 27893

Mr. Charles A. Hayes
Warren County Manager
County Courthouse
Warrenton, N. C. 27589

5. Federal Agencies

Engineering and Watershed Unit
Soil Conservation Service
P. O. Box 11222
Fort Worth,
Texas 76110

U. S. Department of Health, Education, & Welfare, PHC
SSB, NE Technical Service Unit
C. B. Center Building S-26
Davisville, Rhode Island 02854

Chairman
Ohio River Basin Commission
1427 Fourth & Walnut Building
Cincinnati, Ohio 45202

District Engineer
U. S. Army Engineer District
Charleston
P. O. Box 919
Charleston,
South Carolina 29402

U. S. Geological Survey Library
Building 25
Denver Federal Center
Denver, Colorado 80225

Library
Env. Control Administration
Cincinnati Laboratories
5555 Ridge Avenue
Cincinnati, Ohio 45213

Meterologist-In-Charge
National Weather Service
Forecast Office
Raleigh-Durham Airport
P. O. Box 165
Morrisville, N. C. 27560

State Conservationist
U. S. Soil Conservation Service
P. O. Box 27307
Raleigh, N. C. 27611

State Climatologist
National Weather Service, NOAA
U. S. Department of Commerce
P. O. Box 5030
Raleigh, N. C. 27607

District Engineer
U. S. Army Engineer District
Norfolk
803 Front Street
Norfolk, Virginia 23510

E.P.A. Office of Water Programs
Ohio Basin Region
4676 Columbia Parkway
Room 100
Cincinnati,
Ohio 45226

U. S. Department of Interior
Fish and Wildlife Service
Bureau of Sports Fish. & Wildlife
Peachtree-Seventh Building
Atlanta, Georgia 30323

Librarian
Council on Environmental Quality
722 Jackson Place, N.W.
Washington, D. C. 20006

Division Engineer
U. S. Army Engineer Division
South Atlantic
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30301

U. S. Forest Service
1720 Peachtree Road, N.W.
Room 716
Atlanta, Georgia 30304

Executive Director
Water Resources Council
2120 L Street, N.W.
Washington,
D. C. 20005

Regional Engineer
Federal Power
Commission
730 Peachtree Building
Atlanta,
Georgia 30308

Chief, Div. of Power Operations
Southeastern Power Admin.
U. S. Department of Interior
Elberton, Georgia 30635

State Director
Farmers Home Administration
310 New Bern Avenue
Raleigh,
North Carolina 27611

River Basin Planning
Soil Conservation Service
P. O. Box 10026
Richmond,
Virginia 23240

Field Supervisor
Bureau of Sports Fish. & Wildlife
Department of the Interior
Division of River Basin Studies
310 New Bern Avenue - Room 468
Raleigh, N. C. 27611

Director
Division of Water Control Planning
408 Evans Building
Tennessee Valley Authority
Knoxville, Tennessee 37902

U. S. Department of Agriculture
Soil and Water Cons. Res. Div.
P. O. Box 469
Athens, Georgia 30601

District Engineer
U. S. Army Engineer District
Wilmington
P. O. Box 1890
Wilmington,
North Carolina 28402

District Chief, WRD
U. S. Geological Survey
P. O. Box 2857
Raleigh, N. C. 27602

Director
U. S. Department of Agriculture
Agricultural Research Service
Water Quality Management Lab.
Durrant, Oklahoma 74701

Mr. Lee Tebo
Pollution Surveillance Branch
Environmental Protection Agency
Southeast Water Laboratory
Athens,
Georgia 30601

Mr. F. E. Kimball, Jr.
Water Resources Engineer-E.P.A.
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Environmental Protection Agency
Region IV
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309
Attention: Librarian

Economic Research Service
River Basin Studies
P. O. Box 27307
Raleigh,
North Carolina 27611

6. Other States - State Agencies

Executive Director
S. C. Water Resources Commission
3830 Forest Drive
P. O. Box 4515
Columbia, S. C. 29240

Documents Department
Clemson University Library
Clemson, S. C. 29631

Walter Library
University Libraries
Minneapolis,
Minnesota 55455

Director
Water Resources Center
Georgia Institute of Technology
Atlanta, Georgia 30332

The Center for Research Libraries
Documents Department
5721 Cottage Grove Avenue
Chicago, Illinois 60637

Geological Survey of Alabama
P. O. Drawer O
University of Alabama
Tuscaloosa,
Alabama 35486

University of Delaware
The University Library
Newark, Delaware 19711

Water Resources Coordinator
Tennessee State Planning Office
301 Seventh Avenue, North
Nashville, Tennessee 37219

Acquisitions Department
Price Gilbert Memorial Library
Georgia Institute of Technology
Atlanta, Georgia 30332

Technical Report Center
University Library
Texas A & M University
College Station, Texas 77843

Commissioner
Georgia Department of Natural Resources
270 Washington Street
Atlanta, Georgia 30334

Documents Division
University of Illinois Library
Urbana, Illinois 61801

Director
Virginia State Water Control Board
P. O. Box 11143
Richmond, Virginia 23230

State Documents
University of Georgia Libraries
Athens, Georgia 30602

7. Private Organizations, Business and Industry

Mrs. Harry Caldwell, Master
N. C. State Grange
Box H-1
Greensboro, N. C. 27402

Virginia Electric & Power Co.
Ninth and Franklin Streets
Richmond, Virginia 23219
Attention: Mr. C. M. Stallings & Librarian

Wiley and Wilson
Consulting Engineers
2310 Langhorn Avenue
Lynchburg, Virginia 24501

Public Service Research
7050 S.W. 86th Avenue
Miami, Florida 33143
Attention: Mr. Guston Gegguff

Librarian
Metcalf and Eddy
Statler Office Building
Boston, Massachusetts 02116

J. N. Pease Associates
Architects-Engineers
P. O. Box 12755
Charlotte,
North Carolina 28205

L. E. Wooten and Company
120 North Boylan Avenue
Raleigh, N. C. 27603
Attention: Willis D. Barlow

N. C. Association of County Commissioners
P. O. Box 1488
Raleigh, N. C. 27602

Executive Director
N. C. League of Municipalities
P. O. Box 3069
Raleigh,
North Carolina 27602

Duke Power Company
422 Church Street
P. O. Box 2178
Charlotte, N. C. 28201

Henningson, Durham & Richardson
6230 Fairview Road
P. O. Box 11257
Charlotte, N. C. 28209

Moore, Gardner & Associates, Inc.
Consulting Engineers
P. O. Box 10294
Greensboro, N. C. 27404

W. M. Piatt and Company
Consulting Engineers
P. O. Drawer 971
Durham, N. C. 27702
Attention: Mr. P. D. Davis

Hazen and Sawyer Engineers
P. O. Box 30428
Raleigh,
North Carolina 27612

Publisher
N. C. Citizens Association, Inc.
14th Floor Durham Life Building
Raleigh, N. C. 27611

Mr. W. V. Coley
Carolina Power & Light Company
Raleigh,
North Carolina 27602

Charles T. Main, Inc.
1301 East Morehead Street
Charlotte,
North Carolina 28204

Charles T. Main, Inc.
Library
441 Stuart Street
Boston, Massachusetts 02116

Olsen Associates
Engineers & Architects
P. O. Box 10666
Raleigh, N. C. 27605

Stone and Webster Engineering Contractors
Technical Library
225 Franklin Street
Boston, Massachusetts 02107

8. Other

Mr. Horace P. Morgan
Resources Advisory Board
Southeast River Basins
Walton Building Suite 402
Atlanta, Georgia 30303

Coastal Plains Regional Commission
215 East Bay Street
Charleston,
South Carolina 29401