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Coastal Zone Management Study
Water Supply Task
Interim Report

April 1976

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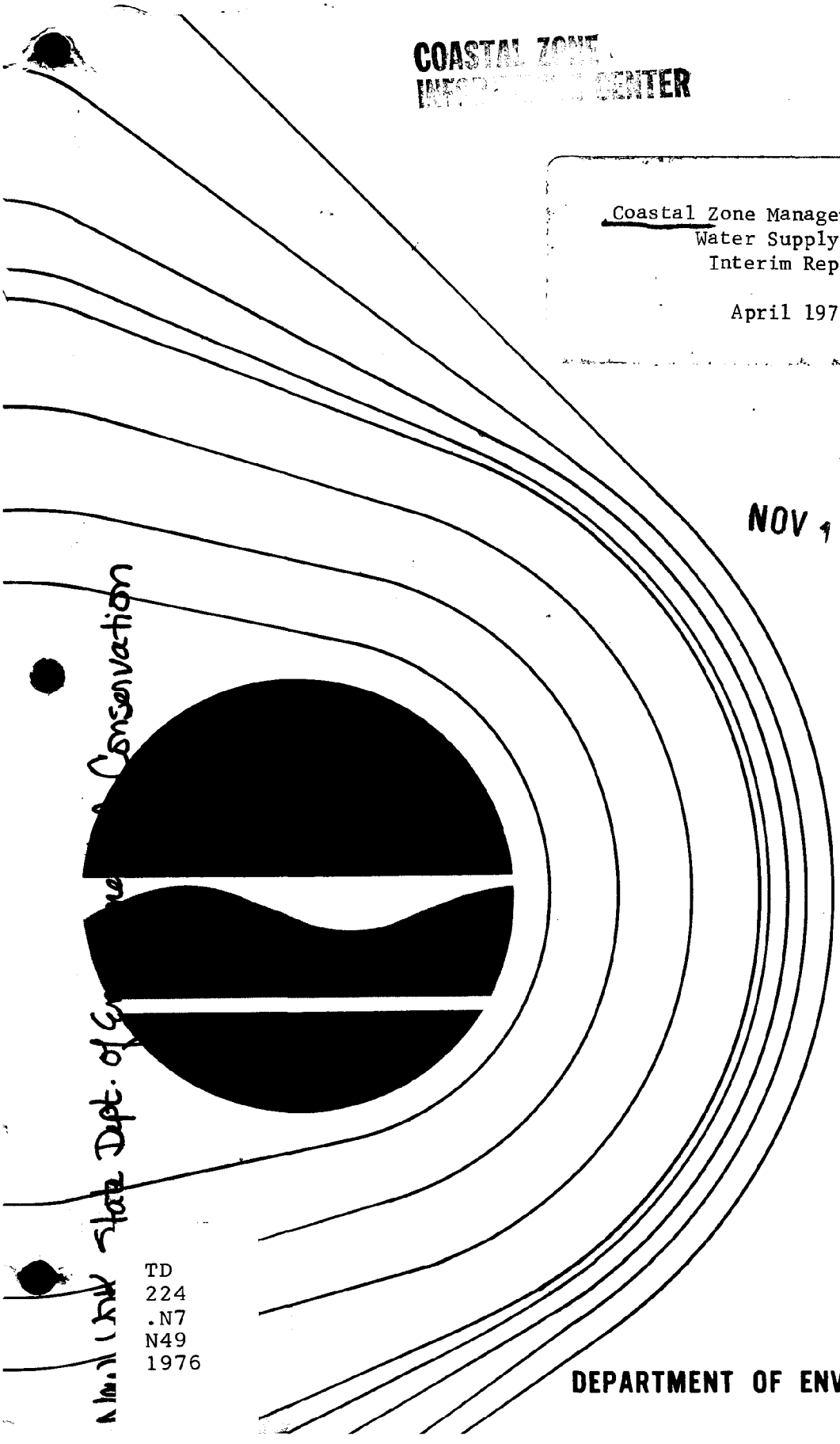

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NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

W.P.

11259

Interim Report
on
Water Supply Studies
for
Coastal Zone Management Program
(Task 8.5)

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Prepared by

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TABLE OF CONTENTS

Title	Page
Summary	
Task Objectives	1
Methodology	3
Findings	4
Section I Lake Erie-Niagara River Subarea	
General	I-1
Chautauqua County	I-2
Erie County	I-9
Niagara County	I-14
Bibliography	I-20
Section II Lake Ontario-St. Lawrence River Subarea	
General	II-1
Orleans County	II-3
Monroe County	II-10
Wayne County	II-21
Cayuga County	II-30
Oswego County	II-36
Jefferson County	II-45
St. Lawrence County	II-54
Bibliography	II-67
Section III Hudson River Subarea	
General	III-1
Albany County	III-2
Rensselaer County	III-9
Greene County	III-15
Columbia County	III-20
Ulster County	III-26
Dutchess County	III-32
Orange County	III-43
Putnam County	III-50
Rockland County	III-54
Westchester County	III-62
Bibliography	III-69
Section IV New York City Subarea	
General	IV-1
Existing Public Water Systems	IV-1
Estimations of Future Water Demands and Potential Water Supply Sources	IV-5
Boundary Line Determination	IV-7
Areas for Protection	IV-8

List of Tables

Table No.	Title	Page
Summary		
Section I - Lake Erie-Niagara River Subarea		
I-1	Existing Public Water Supply Systems, Chautauqua County	I-6
I-2	Existing Public Water Supply Systems, Erie County	I-12
I-3	Existing Public Water Supply Systems, Niagara County	I-17
Section II - Lake Ontario-St. Lawrence Subarea		
II-1	Existing Public Water Supply Systems, Orleans County	II-6
II-2	Existing Public Water Supply Systems, Monroe County	II-19
II-3	Summer Residents - Wayne County	II-26
II-4	Existing Public Water Supply Systems, Wayne County	II-27
II-5	Existing Public Water Supply Systems, Cayuga County	II-32
II-6	Existing Public Water Supply Systems, Oswego County	II-41
II-7	Existing Public Water Supply Systems, Jefferson County	II-50
II-8	Major Water Using Industries of St. Lawrence County	II-57
II-9	Existing Public Water Supply Systems, St. Lawrence Co.	II-58
Section III - Hudson River Subarea		
III-1	Existing Public Water Supply Systems, Albany County	III-6
III-2	Self-Supplied Industrial Water Systems, Albany County	III-7
III-3	Existing Public Water Supply Systems, Rensselaer County	III-12
III-4	Self-Supplied Industrial Water Systems, Rensselaer Co.	III-13
III-5	Existing Public Water Supply Systems, Greene County	III-18
III-6	Existing Public Water Supply Systems, Columbia County	III-23
III-7	Self-Supplied Industrial Water Systems, Columbia Co.	III-24
III-8	Existing Public Water Supply Systems, Ulster County	III-30
III-9	Existing Public Water Supply Systems, Dutchess Co.	III-34
III-10	Self-Supplied Industrial Water Systems, Dutchess Co.	III-38
III-11	Existing Public Water Supply Systems, Orange County	III-47
III-12	Self-Supplied Industrial Water Systems, Orange County	III-48
III-13	Existing Public Water Supply Systems, Putnam County	III-52
III-14	Existing Public Water Supply Systems, Rockland County	III-56
III-15	Existing Public Water Supply Systems, Westchester Co. (Hudson River)	III-64
III-16	Existing Public Water Supply Systems, Westchester Co. (Long Island)	III-67
Section IV - New York City Subarea		
IV-1	Estimated Future Water Consumption from Public Water Supply Systems	IV-6

List of Figures

Figure No.		Page
Summary		
1	Subareas, Limits of Study	2
2	Municipal Intakes	6
3	Aquifers	7
4	Industrial Intakes	8
Section I - Lake Erie-Niagara River Subarea		
I-1	Water Service Areas in Chautauqua County	I-7
I-2	Location of Proposed New Development, Chautauqua Co.	I-8
I-3	Water Service Areas in Erie County	I-13
I-4	Water Service Areas in Niagara County	I-18
I-5	Potential Water Sources in Niagara County	I-19
Section II - Lake Ontario-St. Lawrence River Subarea		
II-1	Existing Public Water Supply Systems, Orleans County	II-7
II-2	Lakeside & Sunset Beach Water System, Orleans County	II-8
II-3	Point Breeze Water Systems, Orleans County	II-9
II-4	Monroe County Service Areas	II-12
II-5	Webster Treatment Plant Site, Monroe County	II-14
II-6	Parma Treatment Plant Site, Monroe County	II-15
II-7	Location of Intakes, Town of Greece, Monroe County	II-20
II-8	Wayne County Existing Facilities	II-22
II-9	Shaker Tract Utilities, Map, Wayne County	II-28
II-10	Recommended Project Phasing, Wayne County	II-29
II-11	Map of Northern Cayuga County	II-33
II-12	Map of Little Sodus Bay, Cayuga County	II-34
II-13	Map of Proposed Ninemile Creek Intake Site, Cayuga Co.	II-35
II-14	Existing Water Facilities, Oswego County	II-42
II-15	Anticipated Water Supply Service Areas, Oswego County	II-43
II-16	Recommended Lake Ontario Supply & Transmission Facilities for Onondaga County	II-44
II-17	Service Areas, Jefferson County	II-51
II-18	Village of Sackets Harbor, Jefferson County	II-52
II-19	Cape Vincent Village Water System Map	II-53
II-20	Existing Water Districts, St. Lawrence County	II-59
II-21	Existing & Potential Major Water Using Industrial Sites, St. Lawrence County	II-60
II-22	Village of Massena, St. Lawrence County	II-61
II-23	Village of Massena Water Supply System	II-62
II-24	City of Ogdensburg Water Supply System	II-63
II-25	Village of Waddington Water Supply System	II-64
II-26	Village of Morristown Water Supply System	II-65
II-27	Tucker Subdivision Water Supply System	II-66

List of Figures

Figure No.		Page
Section III - Hudson River Subarea		
III-1	Albany County (partial)	III-8
III-2	Rensselaer County	III-14
III-3	Greene County (partial)	III-19
III-4	Columbia County	III-25
III-5	Ulster County Public Water Supplies	III-31
III-6	Dutchess County Drainage Basins	III-39
III-7	Dutchess County (north)	III-40
III-8	Dutchess County (central)	III-41
III-9	Dutchess County (south)	III-42
III-10	Orange County (partial)	III-49
III-11	Putnam County	III-53
III-12	Spring Valley Water Company, Inc. (north)	III-57
III-13	Spring Valley Water Company, Inc. (south)	III-58
III-14	Rockland County Municipal Surface Water Supplies	III-59
III-15	Rockland County Water Company Surface Areas	III-60
III-16	Rockland County Municipal Ground Water Supplies	III-61
III-17	Major Water Supplies in Westchester & Fairfield Counties	III-68
Section IV - New York City Subarea		
IV-1	Coastal Zone Area of the City of New York	IV-2
IV-2	Existing Surface Water Supplies of New York City	IV-4

Summary of the Interim Report

Water Supply Task

Coastal Zone Management

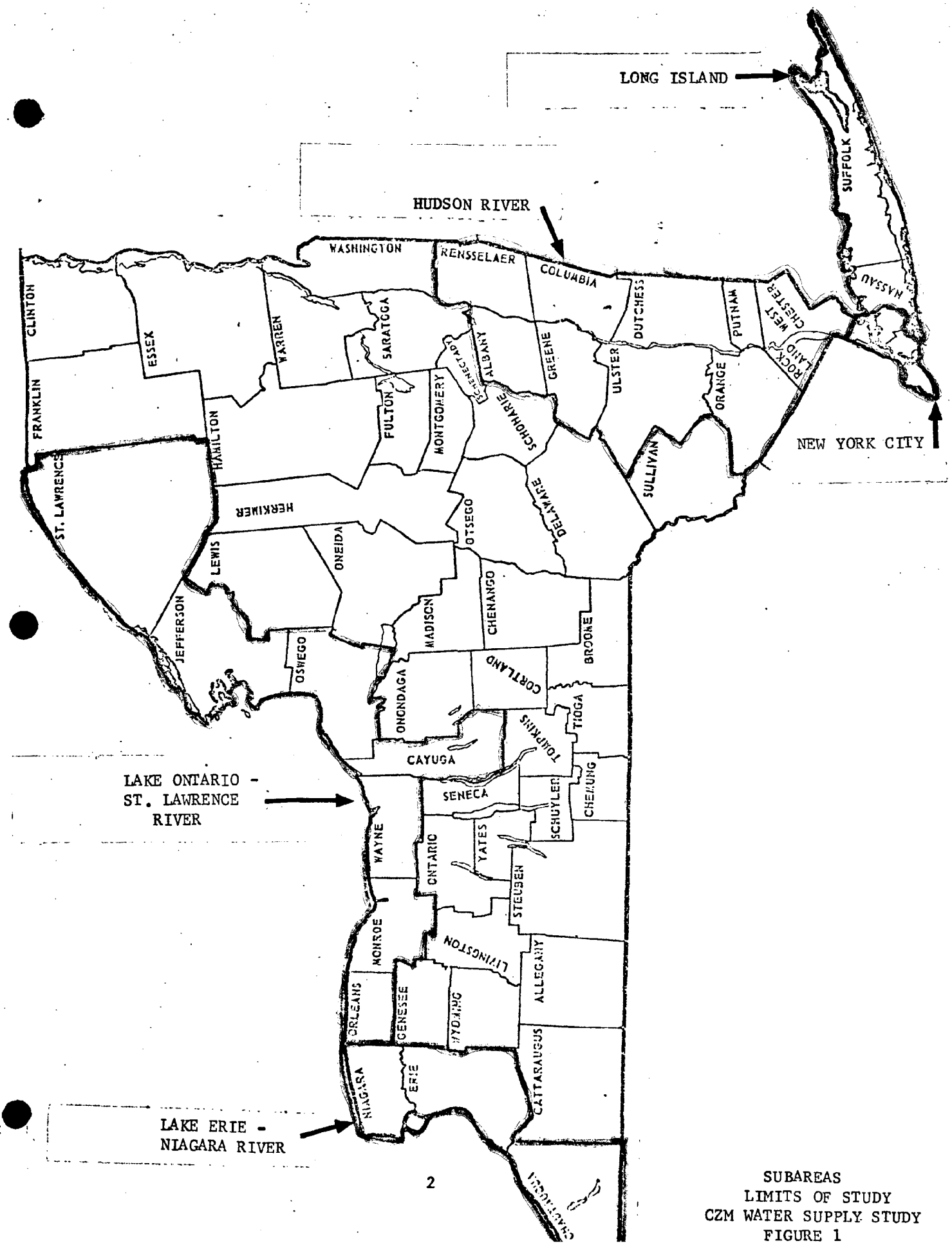
Task Objectives

The coastal zone management program must consider many facets of the environmental picture and form a program that will ensure the harmonic use of the coastal zone resources. The water supply study was undertaken to examine water use along the coastal zone and to identify ways in which the coastal zone management program could protect and safeguard existing and potential future sources of water supply. Another objective was to provide information for determining where the coastal zone boundary line should be by identifying areas along the coast, which from a water supply standpoint should be included within the boundary.

For purposes of the water supply component of the coastal zone management study, the coastal zone area in New York State was divided into the following five subareas:

- the Lake Erie-Niagara River Subarea, which includes all of Niagara County,
- the Lake Ontario-St. Lawrence River Subarea,
- the Hudson River Subarea, which extends from the Federal Dam in Albany and Rensselaer Counties downstream to the New York City Boundary
- the New York City Subarea and
- the Long Island Subarea

These are shown on Figure 1. All except the Long Island Subarea are covered in this report.



SUBAREAS
LIMITS OF STUDY
CZM WATER SUPPLY STUDY
FIGURE 1

Within each subarea water supply was examined on a county by county basis and is presented as such in this report. Within each county, emphasis was placed upon the water supply systems serving communities which are adjacent to the coast. Water supply systems which serve inland areas and take their supply from the coast, such as Onondaga County, were examined in terms of their point of taking to determine if the Coastal Zone Management program could be useful in protecting the source, intake, or associated facilities.

Methodology

After limiting the area of study provisionally to a one county depth, a review was made of all pertinent reports concerning the existing and projected future use of water within those counties. These reports included the county comprehensive water supply studies, reports of the U.S. Geological Survey, Regional Water Resources Planning Board reports, the Northeastern United States Water Supply Study, and the study by the Temporary State Commission on Water Supply Needs of Southeastern New York. A bibliography for each subarea is included in this report.

Using the above reports, the existing source of supply, present and future water supply demand, service area and potential future sources of supply were determined for each water supply system serving a community along the coast. Maps were gathered which show the service areas and sources of supply for these communities. It was then possible to identify areas which from a water supply standpoint should be included within the coastal zone. It was also possible to identify areas which could be protected through the Coastal Zone Management Program. Interviews with local people, who use the coastal zone areas for water supply purposes, have commenced in two of the subareas.

Findings

1. There are 25 counties and 469 water districts located in the 4 subareas examined in this report. Number of water districts located directly adjacent to the coast is 155.

2. Upland sources serve 109 of the water districts located directly adjacent to the coast and the remaining 41 use coastal waters as a source of supply. (Fig. 2). Both upland and coastal sources are used by 5 of the water districts.

3. The largest systems using coastal waters are those serving the Buffalo, Rochester and Syracuse areas. The largest system using upland sources is the New York City system.

4. Ground water aquifers are used as a source of supply by 15 municipal systems adjacent to the coast. (Fig. 3). Two additional aquifers have been identified as potential future sources of supply.

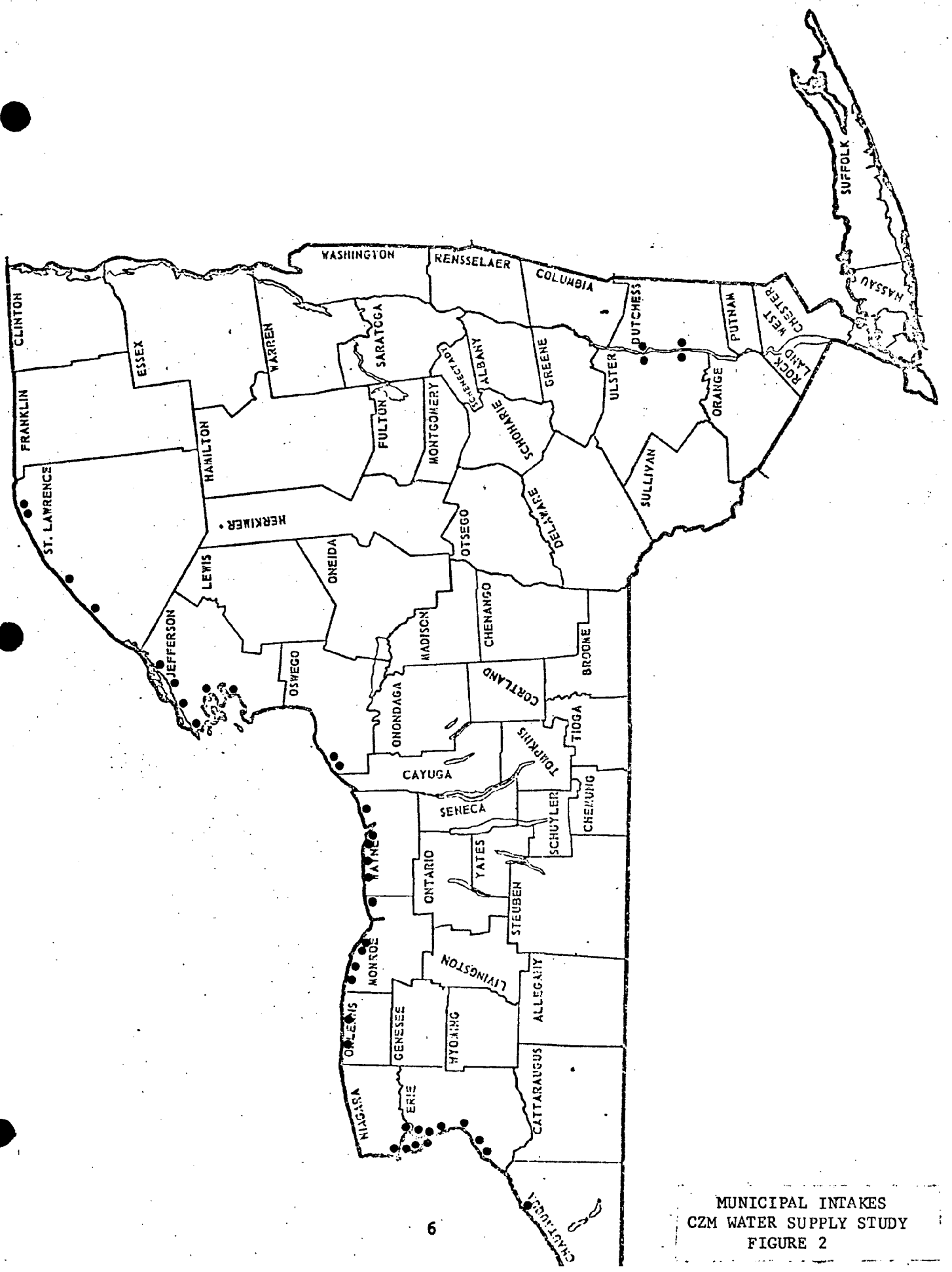
5. There are 21 industrial firms which are known to use the coastal waters as a source of supply. Probably other industries use coastal waters as a source of supply. (Fig. 4). However, information on these is not available.

6. In selecting the boundary of the coastal zone, consideration should be given to including certain aquifers in the lower Hudson within the zone to be managed. Further work should be undertaken as part of the second year program to identify those aquifers which should be protected by the coastal zone management program and to determine where the boundary line should be located with respect to the aquifers.

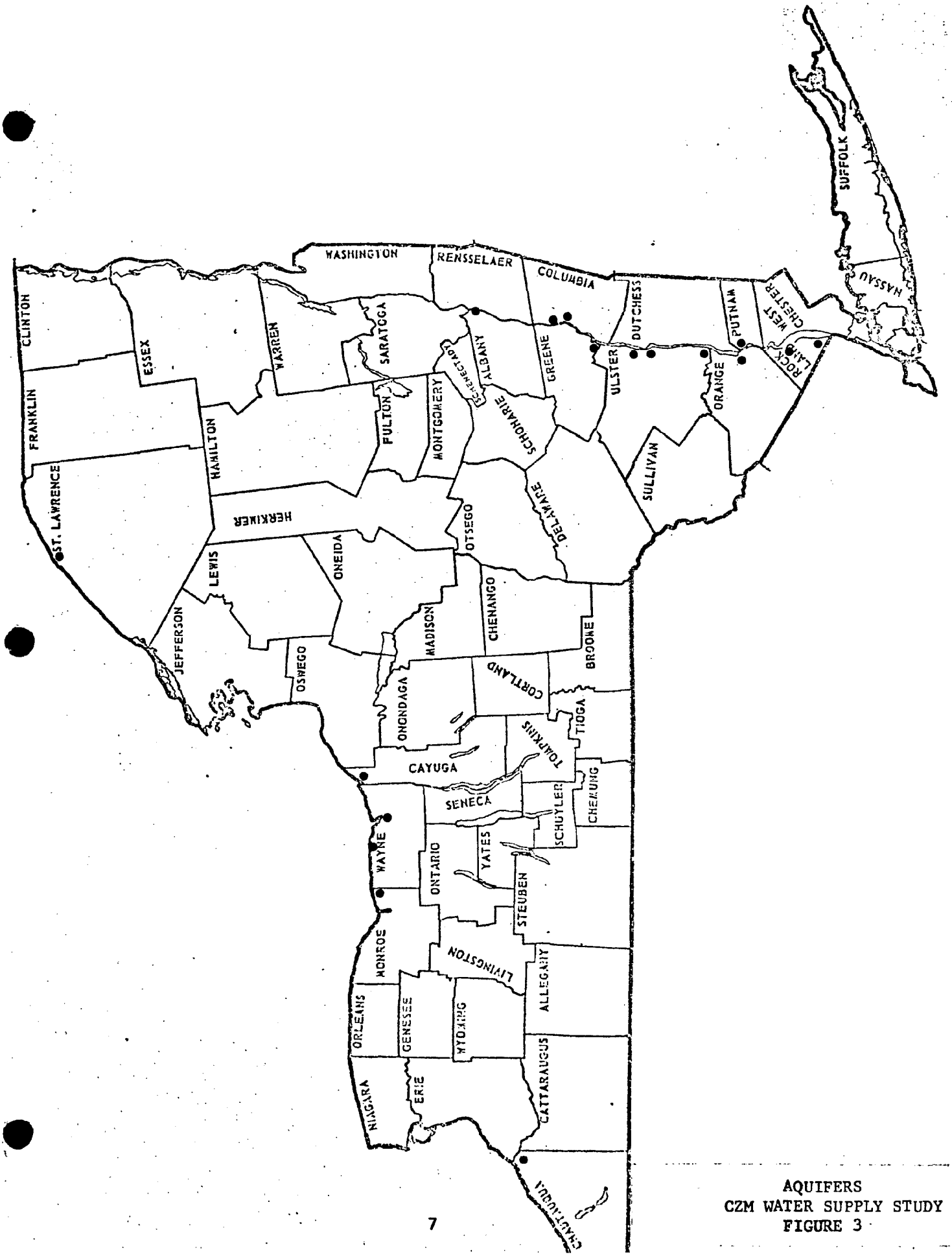
7, Consideration should be given to using the coastal zone management program as a tool to control the use of land and water areas in the vicinity of existing and potential future water supply intakes. The second year program should identify the location and extent of such areas and the type of management required.

8. Where the sites of future water supply intakes along the coastal waters are known consideration should be given to using the coastal zone management program to preserve these sites, providing this is acceptable to and desired by the local water supply users.

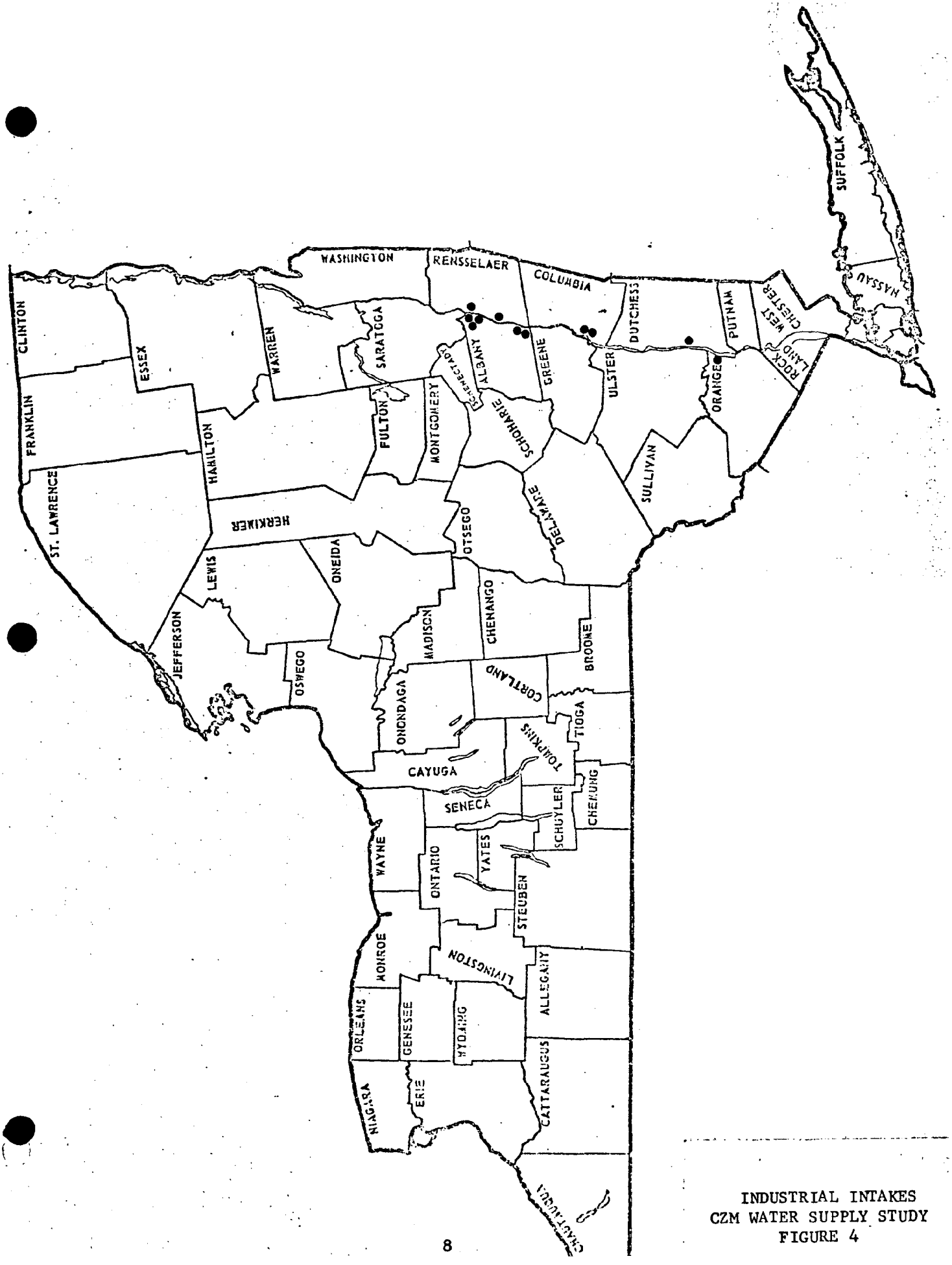
9. Although water quality at existing intakes in Lake Erie, Lake Ontario and the Hudson River is generally good,the future quality of the water should be protected through such means as New York State Health Department 's Watershed rules, by preventing waste from being discharged too close the water supply intakes and by limiting use of chemical sprays adjacent to coastal waters.



MUNICIPAL INTAKES
CZM WATER SUPPLY STUDY
FIGURE 2



AQUIFERS
CZM WATER SUPPLY STUDY
FIGURE 3



INDUSTRIAL INTAKES
CZM WATER SUPPLY STUDY
FIGURE 4

SECTION I

LAKE ERIE - NIAGARA RIVER SUBAREA

GENERAL

Lake Erie-Niagara River sub-area consists of a three county area, Chautauqua, Erie, Niagara in the Western New York State. At this time, no definite boundary lines of coastal zone have been delineated. In this study, however, the attempt was made to include those areas where the water supply may be affected by large scale coastal zone management programs, and vice versa (Figure I-1).

Public water supply systems provide service to the majority of residents and many industrial and commercial users in the study area. The largest public water supplies serve Buffalo, the town of Tonawanda and the metropolitan Erie County. In the remainder of the sub-area there are twelve smaller public water systems. Large water systems take water from either Lake Erie and the Niagara River. Water sources for small systems are very diversified. They include upland reservoirs, streams, and groundwater aquifers as well as Lake Erie and the Niagara River.

Chautauqua County

Chautauqua County is located on the western boundary of New York State along the southerly shore of Lake Erie. The major economic activities are associated with heavy industry in the City of Dunkirk as well as the agricultural and the resulting canning activities in the remainder of the area.

Most of the county drains southerly through the Allegheny River Basin. The northwesterly portion drains into Lake Erie via Chautauqua, Canadaway, Walnut and Spring Creeks as well as several smaller tributaries.

The potential coastal zone area is underlain by shale with surficial deposits of sand and gravel. The major aquifers are located along the streambeds of Chautauqua Creek, Canadaway Creek and Walnut Creek.

Municipal Water Systems

The county has 17 municipal water systems of which 7 systems are located within the potential coastal zone area. Surface water sources are used by 7 systems within the county or 6 systems within the potential coastal zone area. Groundwater sources are used by 10 water districts within the county or 1 district within the coastal zone area. The water districts within the coastal zone area are listed in Table I-1 and described briefly below.

Village of Silver Creek

Water supply is obtained from two impounding reservoirs along Silver Creek. Dependable yield of the source is about 2.0 mgd, which is considered adequate for present and projected future needs. However, present treatment consists of chlorination only. CPWS-49 recommends that a filter plant be built at a proposed site near the reservoirs about 6 miles from shoreline.

City of Dunkirk

The Dunkirk system takes water from Lake Erie. The existing intake and treatment capacity of 8 mgd is considered adequate to meet present and projected future demands.

Village of Fredonia

The Village obtains water from Fredonia Reservoir located on Canadaway Creek. The present estimated safe yield of the reservoir is 1.94 mgd, which bearly meets peak demands during the canning season. CPWS-49 considered a reservoir site on Canadaway Creek at Shumla Fall, but recommend an interconnection with the City of Dunkirk system.

Village of Forestville

The Village obtains its water from 3 springs of unknown yield and a small auxillary well. The supply is barely adequate to meet present demands. Although a reservoir site on Walnut Creek was considered, CPWS-49 recommended that the village develop additional groundwater sources to meet projected demands.

Village of Brocton

The Village takes water from three reservoirs in the Slippery Rock Creek watershed known as Brocton, Risley, and Burr Reservoirs. In an emergency, water can be pumped from Bear Lake into the watershed. Without Bear Lake water, the safe yield of the system is 0.586 mgd. The existing system is considered adequate to meet projected demands with minor modifications to the treatment and distribution system.

Village of Westfield

The Village uses the Chautauqua Creek watershed as its source of water. A reservoir on Minton Creek and an intake on Chautauqua Creek supply the treatment plant by gravity flow. During low flows, water is pumped from Chautauqua Creek downstream from the intake into the Minton Reservoir. The safe yield of the system is estimated as 0.97 mgd. After considering a system using Lake Erie as a source, CPWS-49 recommended that the Village construct a reservoir on Chautauqua Creek.

Ripley Water District

The District takes water from Alford Reservoir on Belson Creek. The safe yield of the reservoir is estimated as 0.33 mgd. After considering the use of Lake Erie as a source of raw water, CPWS-49 recommended further development of Belson Creek.

Self-Supplied Industrial Water Systems

In the study area, canning industry and grape industry are the important economic forces. Private water supply for industrial purpose were estimated by the Allegheny River Basin study to be about 20 to 30 percent of the public water uses. Lake Erie is the major source of privately owned industrial water supply. No further information is available.

Boundary Line Determination

On the basis of this preliminary investigation, no particular consideration concerning water supply situation is needed in establishing the coastal zone boundary line.

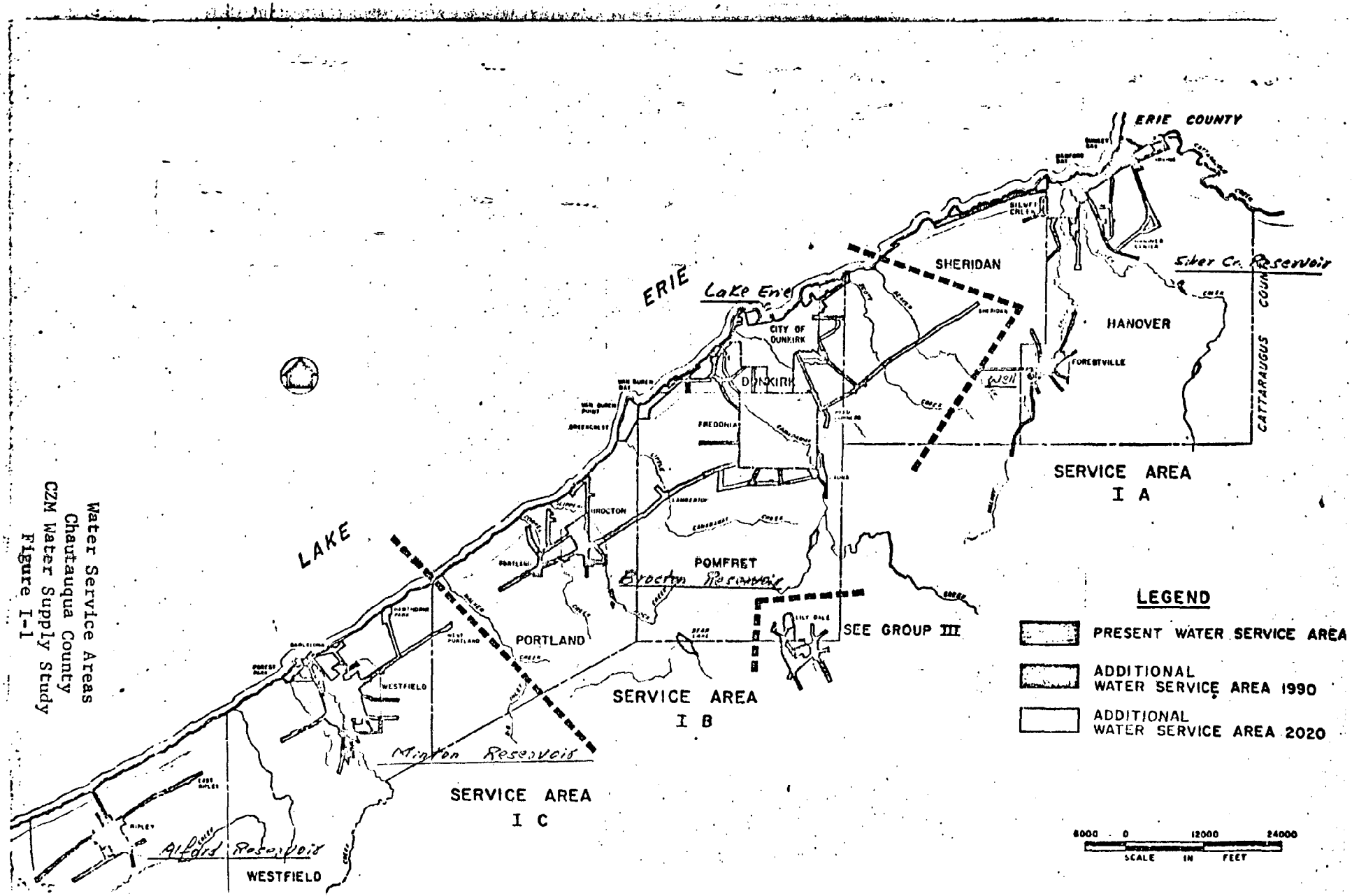
Areas for Protection

All of the new developments are located more than three miles away from coastal zone and thus would not induce any direct impact on coastal zone management. The existing intake from the City of Dunkirk and some existing (unknown) industrial intakes are possibilities. The sites of the intakes considered, but rejected by CPWS-49 are of lesser consideration.

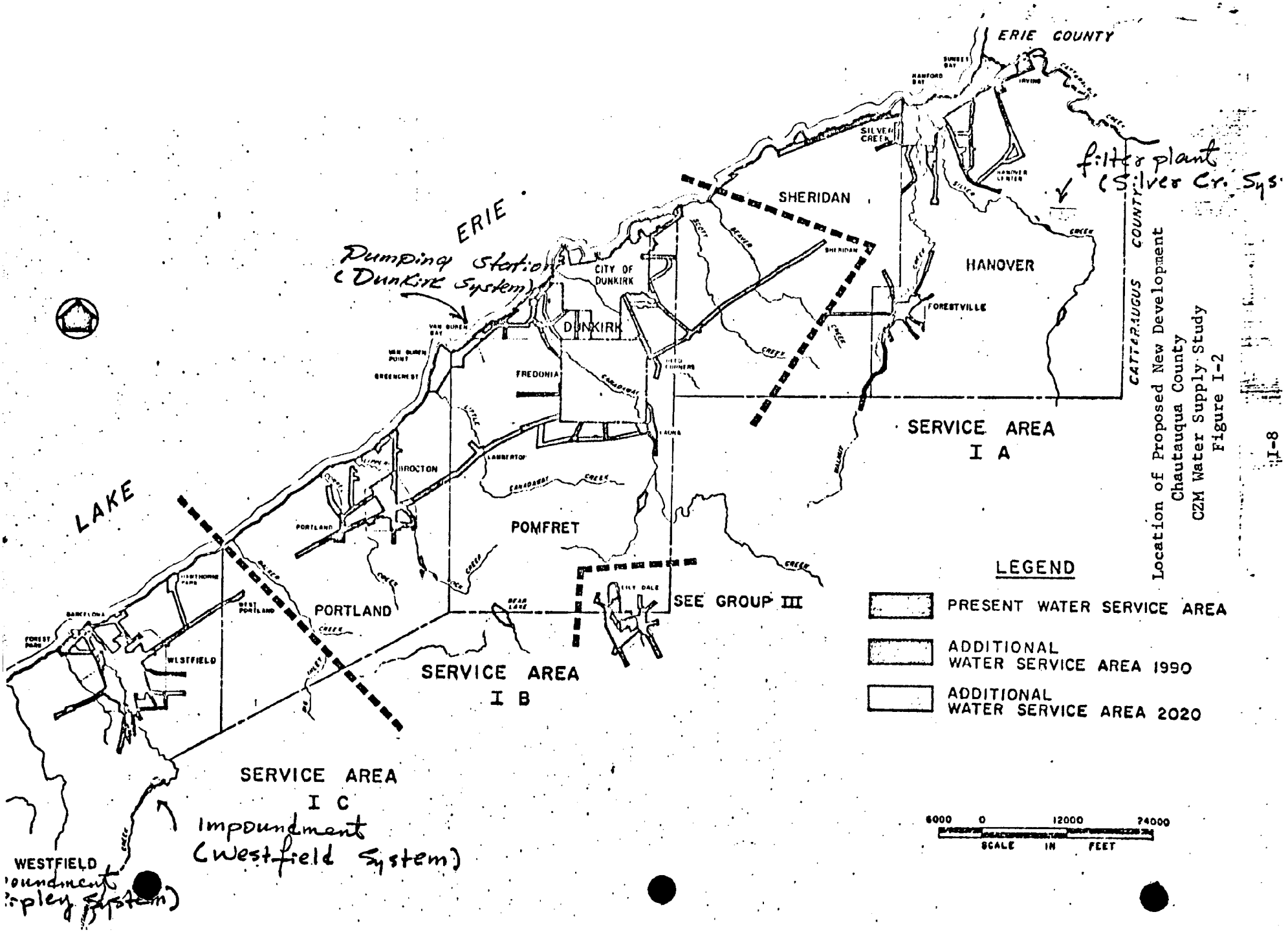
TABLE I-1

Existing Public Water Supply Systems
Coastal Zone Area
Chautauqua County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Dunkirk	Lake Erie	8.0	4.35	5.14	6.66	
Fredonia	Fredonia Reservoir	1.9	1.31	2.26	3.01	1. Purchase from Dunkirk 2. Canadaway Creek
Westfield	Minton Cr. Reservoir	0.97	0.74	1.05	1.44	1. Chautauqua Reservoir 2. Lake Erie
Silver Cr.	Silver Cr.	2.0	0.26	0.49	0.73	
Brocton	Brocton Reservoir	0.6	0.34	0.43	0.55	
Ripley	Alford Reservoir	0.3	0.12	0.30	0.47	1. Belson Cr. Reservoir 2. Lake Erie
Forestville	Groundwater			0.10	0.14	1. Groundwater 2. Walnut Cr.



Water Service Areas
Chautauqua County
CZM Water Supply Study
Figure I-1



Location of Proposed New Development
Chautauqua County
CZM Water Supply Study
Figure I-2

I-8

Erie County

Erie County is located along the easterly shores of Lake Erie and the Niagara River. The major economic activity is manufacturing especially in the primary metals industries.

The entire county drains into the Lake Erie-Niagara System. The major tributaries are Cattaraugus, Tonawanda, Buffalo and Cazenovia Creeks.

The northern quarter of the county is underlain with limestone formations, which are good yielding aquifers. Surficial deposits from the Ice Age overlie the bedrock formations. For the coastal zone area, the valley adjacent to Cattaraugus Creek, which is the southern boundary of the county, is a good yielding aquifer.

Municipal Water Supply Systems

In Erie County there are 19 public water systems with own supply facilities. Seven of them take water from either Lake Erie or the Niagara River. The others use inland surface water (streams and reservoirs). These systems are listed in Table I-2 and briefly described below.

Erie County Water Authority (ECWA)

This water utility serves about 55 percent of the Erie County population outside of the City of Buffalo. Communities which are wholey of partly served by the Authority include the Towns of Amherst, Clarence, Newstead, Cheektowaga, Lancaster, Alden, West Seneca, Elma, Orchard Park, Hamburg, Evans, Eden, Boston, Aurora and the City of Lackawanna.

The E.C.W.A. owns and operates two water treatment plants, Woodlawn and Sturgeon Point. Both plants take water directly from Lake Erie. Sturgeon plant has a nominal capacity of 50 mgd and the Woodlawn Plant has a capacity of 13 mgd. The Woodlawn plant is recommended for expansion to 38 mgd by 1990 and 78 mgd by 2020. Also recommended is a new plant shared with the Town of Tonawanda in the future.

The City of Buffalo System

Buffalo System takes its water from Lake Erie. Existing intake and other plant facilities are adequate to meet the present and most of the projected future water demands. The system serves the entire City of Buffalo. In addition, the city has a total of six interconnections with the E.C.W.A. and the town of Tonawanda system. These interconnections provide supplemental water supply for E.C.W.A. and the town of Tonawanda during periods of high demands. Expansion of intake and treatment facilities is recommended after the year 2000.

Town of Tonawanda System

The Town of Tonawanda System takes its water from the Niagara River. The intake has a capacity of 150 mgd, which is adequate to meet the present and future water demand. The existing filtration capacity of 24 mgd is recommended for expansion to 136 mgd by the year 2020. The Town of Tonawanda has interconnections with the E.C.W.A. and the City of Buffalo for emergency purposes. CPWS-55 recommends that all 19 systems within the county be incorporated into using 6 sources. Expansion of the Tonawanda System is a vital part of the recommendation.

City of Tonawanda System

The City of Tonawanda System takes its waters from the East Branch of the Niagara River. The system is inadequate in meeting the future demands. CPWS-55 recommended that the city purchase water from the Town of Tonawanda.

Town of Grand Island System

Grand Island receives its major water supply from its own plant and supplemental supply from the Niagara County water district's Wheatfield plant. The town plant takes its water from the West Branch of the Niagara River, which has water of excellent quality. CPWS-55 recommended that the Town become part of the E.C.W.A. system.

Village of Angola

The village takes its water from Lake Erie. The system has a capacity of 0.80 mgd. CPWS-55 recommends that this system be part of the E.C.W.A. system by 1980.

Wanakah Water Company

The company takes it water from Lake Erie. The capacity of the system is 1.0 mgd. CPWS-55 recommends that this system be part of the E.C.W.A. system by 1980.

Self Supplied Industrial Systems

Industrial water use is projected to increase. However, no information is readily available concerning self supplied industrial water systems.

Boundary Line Determination

On the basis of preliminary data no particular consideration concerning the water supply situation is needed in establishing the coastal zone boundary line.

Areas for Protection

The areas surrounding the intakes may need protection.

Table I-2

Existing Public Water Supply Systems

Coastal Zone Area

Erie County

Water System	Existing Sources & Capacity: Sources	System Capability (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Erie County Water Authority	Lake Erie	198	47.5	110.0	224.5	Expand Woodlawn plant
Buffalo (City)	Lake Erie	160	128.0	143.6	168.9	Expand filter plant
Tonawanda,Town	Niagara River	24	22.5	27.4	34.2	Expand filter plant
Tonawanda,City	Niagara River					
Grand Island, Town	Niagara River		1.3	2.9	7.9	Purchase water from E.C.W.A.
Wanakah Water Company	Lake Erie	1.0	0.72			Purchase water from E.C.W.A.
Angola (village)	Lake Erie	0.8	0.75			Purchase water from E.C.W.A.

Water Service Areas
Erie County
CZM Water Supply Study
Figure I-3

Niagara County

Niagara County is located in the northwesterly corner of the State being bounded by Lake Ontario on the north and the Niagara River on the west. The economic activity in the southern portion of the county is closely related to the industrial mix for the Buffalo SMSA with the chemical industry being the major employer in the county. In the northern portion, agriculture is a major economic activity.

The topography of the county is divided into two district parts by the Niagara Escarpment which forms Niagara Falls on the Niagara River and extends easterly through the county. South of the escarpment, the county is drained westerly toward the Niagara River by Tonawanda Creek and other smaller tributaries North of the escarpment, the county is drained northerly to Lake Ontario by Eighteenmile Creek and other small tributaries.

Geologically the southern half of the county is underlain by bedrock of limestone and shale, which are generally considered potentially good yielding aquifers. Surficial deposits of till and drift overlay the bedrock formations and are not considered good aquifers.

Municipal Water Supply Systems

There are four major public water supply systems in the county, which are serving about 90 percent of the population. All of the systems use the Niagara River as its source. The characteristics of these systems are summarized in Table I-3 and described briefly below.

Niagara Falls City System

The City of Niagara Falls draws water from the West Branch of the Niagara River at a point between Navy Island and Grand Island. The intake has a safe yield of 80 mgd. The existing filtration plant has a rated capacity of 64 mgd.

The City also supplies water to the Villages of Lewiston and Youngstown and a strip area along the Niagara River to Fort Niagara State Park. The capacity of existing facilities will soon be exceeded. Expansion of existing facilities at same location is recommended by CPWS-59.

North Tonawanda City System

Water for the City of North Tonawanda is obtained from the East Branch of the Niagara River. Existing intake has a capacity of 40 mgd which is considered adequate for present and for the projected future use.

Lockport City System

The City of Lockport obtains water from two sources. The City owns a treatment plant which draws water from the East Branch of the Niagara River near the north end of Tonawanda Island and has a capacity of 30 mgd. The City also purchases supplemental water from the Niagara County Water District in periods of high demand . CPWS-59 recommends further reliance on the NCWD system.

Niagara County Water District

The District takes water from the West Branch of the Niagara River. It serves the 12 towns of the County, the villages of Wilson and Barker, and part of the Village of Middleport. The District also supplies water to the Village of Medina and environs in Orleans County and to the northern half of the Town of Grand Island in Erie County.

The intake of this system is capable of carrying a total flow of about 100 mgd, which is adequate to meet the projected needs for 1980. After then, a new intake at the Hamlet of Oleott is recommended to take water from Lake Ontario. Another intake at Youngstown is recommended for later, which will also use Lake Ontario as the potential source. CPWS-59 also recommends the

expansion of the Wheatfield filter plant from the existing capacity of 20 mgd to 114 mgd for projected needs in 2020.

Self Supplied Industrial Systems

There are a large number of industries in Niagara County. They obtain water wholly or partly from public water system, which are evaluated as part as the public system needs.

Boundary Line Determination

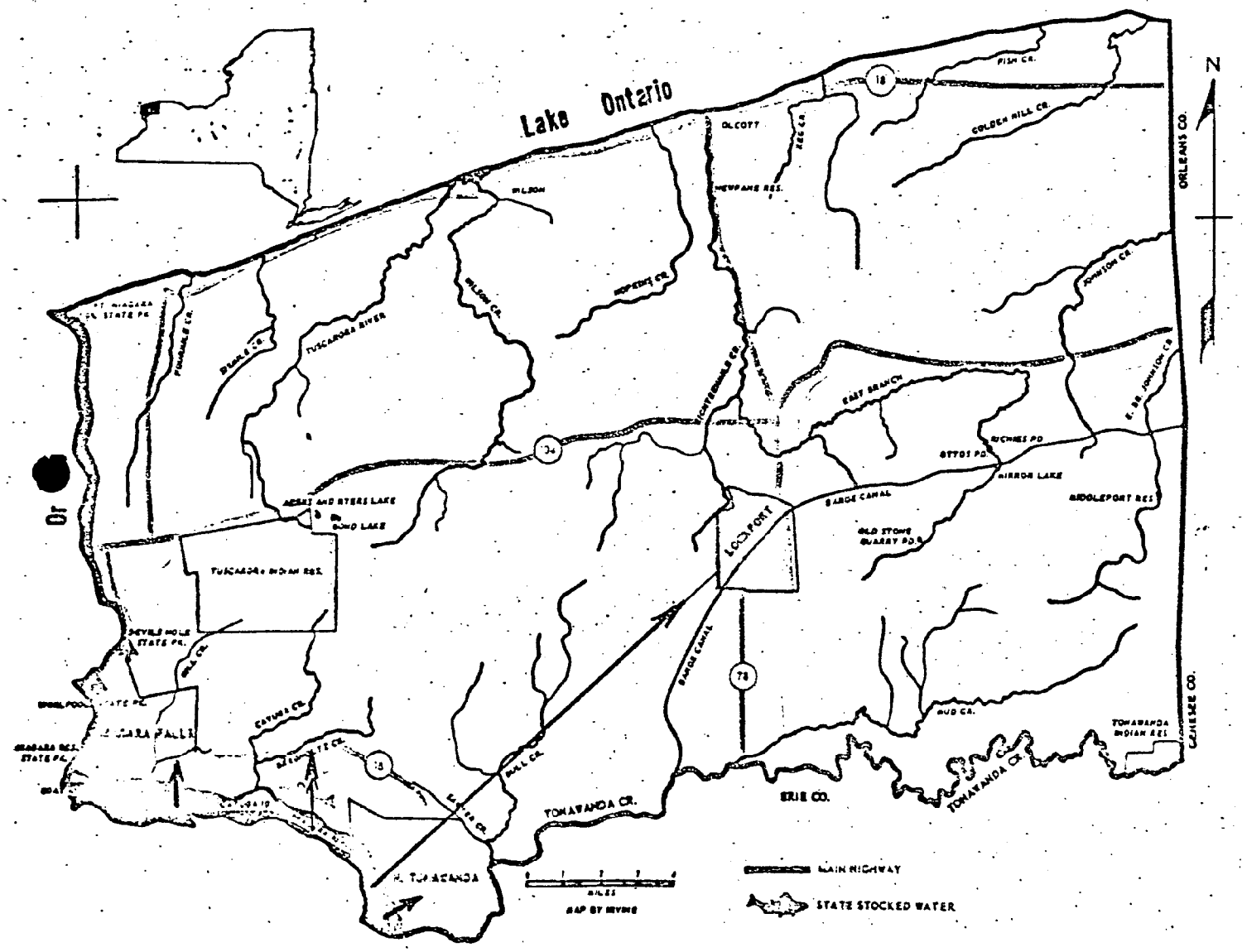
There are no specific considerations for the determination of the boundary line.

Areas for Protection

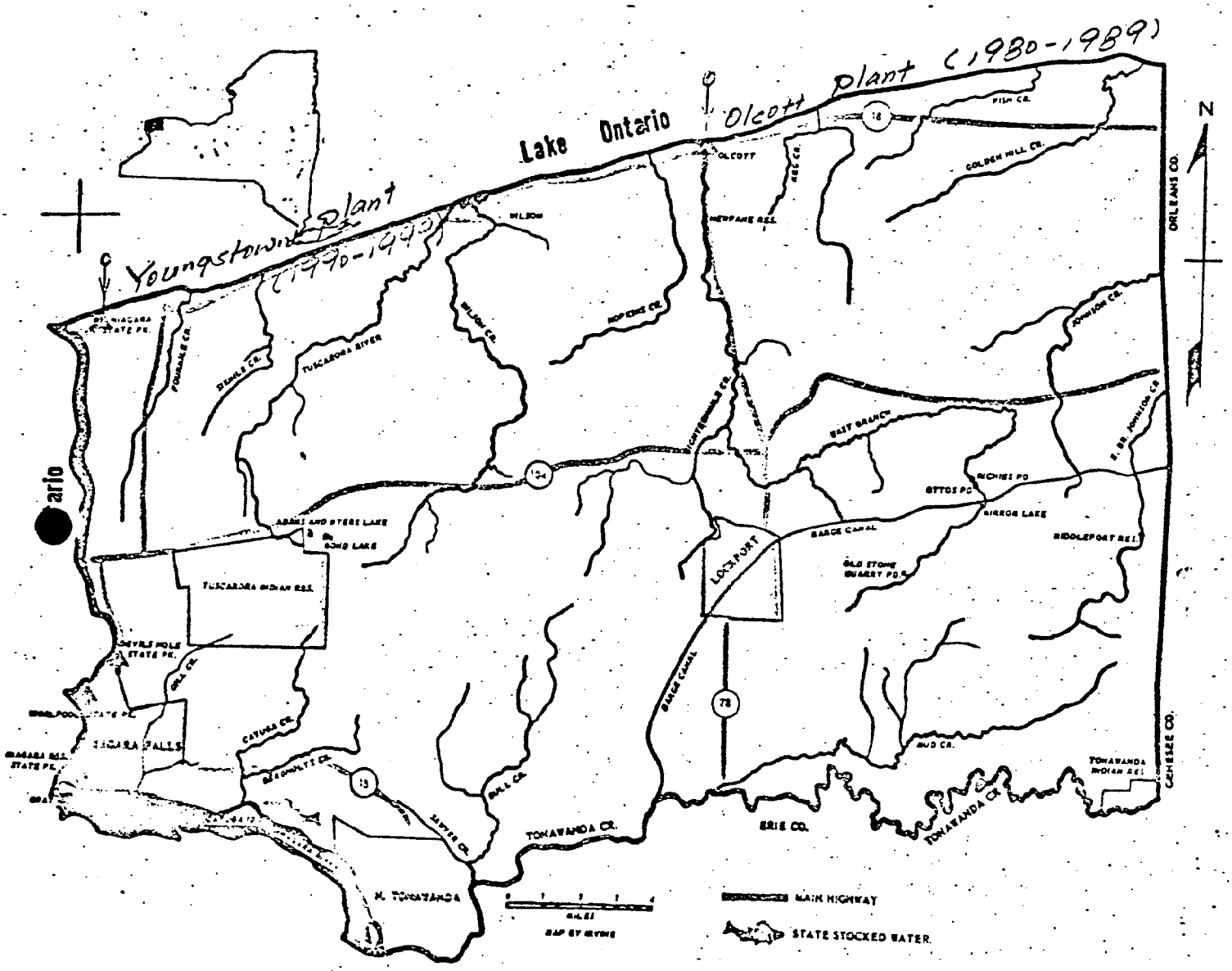
Except for the possible protection of the areas surrounding the intakes, there appears to be no areas for protection.

Table I-3
Existing Public Water Supply Systems
Coastal Zone Area
Niagara County

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Niagara Falls, City	Niagara River	64	52	68	90	Expand intake capacity
N. Tonawanda, City	Niagara River	40	14	22	39	Obtain water from NCWD
Lockport, City	Niagara River	30	15	19	25	Obtain water from NCWD
Niagara Co. Water District (NCWD)	Niagara River	100	40	86	214	1. Lake Ontario 2. Expand intake Capacity



Water Service Areas
Niagara County
CZM Water Supply Study
Figure I-4



Potential Water Sources
Niagara County
CZM Water Supply Study
Figure I-5

V. List of References

a. Allegheny River Basin, Alternatives Report, by Allegheny River Basin Board, 1971

b. Comprehensive public water supply study, Chautauqua County, CPWS-49, by Metcalf & Eddy Engineers, 1968

c. Comprehensive public water supply study, Erie County, CPWS-55, by Greeley & Hansen Engineers, 1970

d. Comprehensive public water supply study, Niagara County, CPWS-59, by Greeley & Hensen Engineers, 1970

e. Erie-Niagara Basin, Comprehensive Water Resources Plan, by New York State Water Resources Commission, 1969

f. Water utility management information series for local officials, Bulletin No. 3, State of New York, 1970

SECTION II

LAKE ONTARIO - ST. LAWRENCE RIVER SUBAREA

GENERAL

The Lake Ontario-St. Lawrence River Sub-area covers more than 300 miles of shoreline in New York State with approximately two-thirds of this amount bordering Lake Ontario. Eight counties are involved: Niagara, Orleans, Monroe, Wayne, Cayuga, Oswego, Jefferson and St. Lawrence. For convenience, Niagara County was included in the Lake Erie-Niagara River Sub-area and will not be considered further in this section. The combined population of the remaining seven counties, according to the 1970 Census, is slightly over 1,200,000. In addition to this, Onondaga County, with a population of 472,000, is a major user of Lake Ontario water, and therefore has a significant influence on the Lake Ontario coastline. Added to this amount must be the large number of people who use the coastline for recreational purposes. The State Parks along the coastline of Jefferson and St. Lawrence counties serve over one million visitors annually. So, perhaps 3.5 to 4.0 million people affect the coastline of the Lake Ontario - St. Lawrence River Sub-area.

Thirty-three public water supply systems affect the coastal area within the Subarea, either by obtaining source supply or by the inclusion of their service area within one mile of the coastline. These systems supplied about 825,000 permanent residents as well as many tourists and industrial and commercial concerns in 1970. The average daily demand was about 132 million gallons a day.

The vast quantities of water available from Lake Ontario and the St. Lawrence River make these sources very attractive to water supply planners. The water quality is, overall, excellent. It can be expected that most of the large inbasin areas in central and northern New York will eventually seek to use these sources for their needs.

Most of the data contained in this report was obtained from the county Comprehensive Public Water Supply Studies. A bibliography of all sources appears at the end of the report.

Following is a county-by-county compilation of the water supply systems in the vicinity of the Sub-area's coastline and an analysis of their effect on the coastal area.

ORLEANS COUNTY

Orleans County can be classified as a rural area. Its economy is principally based on agriculture, although some of its work force is employed in the Buffalo and Rochester areas. Population growth through 1995 is expected to be moderate, compared to the State average, with most of the growth occurring adjacent to the villages.

The northern part of the county comprises a moderately flat or undulating plainlike area, part of the Ontario plain. It has no abrupt or sudden changes in relief. The shoreline bordering Lake Ontario is fairly even with no deep bays or indentations. Along the edge of the lake there is an abrupt bluff rising from the lake shore to the plain which ranges from 5 to 40 feet in height, and this is bordered by a narrow gravel beach, ranging from 10 to about 25 feet in width, that extends from the foot of the bluff to the water's edge.

Lake Ontario has a modifying effect on the climate of the northern half of the county which makes it suitable for the growth of fruit. Large scale fruit growing is prevalent here and fruit processing and canning in the autumn creates a heavy demand for water in some areas.

The drainage system of Orleans County consists of several small streams which drain directly into Lake Ontario. The largest of these is Oak Orchard Creek. The Barge Canal runs east-west through the middle of the county. There are no lakes of any significant size.

Groundwater is not prevalent in the county in any great amounts. Areas not served by public systems must rely on individual wells which, in many instances, fail to provide sufficient water of suitable quality throughout the year. An evaluation of the aquifers in the county was made for the Orleans County Comprehensive Public Water Supply Study. Indications were that it is unlikely that groundwater sources could provide dependable supplies for new local systems.

A. Description of Public Water Supply Systems

There are six water supply service areas in the county. Four of these systems receive all or part of their supply from water systems in adjacent counties. Yates Water District #2 and the Village of Medina are supplied by the Niagara County Water District. The Kendall-Hamlin Water District and the Village of Holley are connected to the Brockport, Monroe County, system. The Villages of Albion and Lyndonville obtain their water supply from Lake Ontario. Following is a description of those systems affecting the coastal area.

1. Village of Albion

In addition to the Village, the system serves the hamlets of Gaines, Oak Orchard-on-the-lake in the Town of Carlton from Lake Ontario and treated at a treatment plant located adjacent to the lake. The system if capable of meeting anticipated demand for at least the next 15 years. Expansion of the treatment facility would be required to meet projected increased demands and expansion to adjacent suburban areas.

2. Village of Lyndonville

The Lyndonville system serves the Village of Lyndonville and the hamlets of Yates Center and Shadigee. Water is pumped from Lake Ontario and is processed at a treatment plant located adjacent to the lake. The treatment plant is more than 50 years old but it is still in good condition. The plant has a rated capacity of 0.20 mgd which is sufficient to meet Lyndonville's needs through the study period. However, it is approaching the end of its economic life and will eventually have to be replaced.

The Comprehensive Water Supply Study presents information for new water systems to serve hamlets in thecounty projected to have 80 or more homes by the year 1990. Because of the general inadequacy of groundwater supplies in the county it is assumed

that the new systems would have to obtain their supply from existing village systems. Locations of the proposed new service areas near the coastal zone are shown on Figure II-1 These systems are not now economically feasible. Table II-1 summarizes the present and projected demands for the Villages of Albion and Lyndonville and the alternatives for meeting their future needs.

B. Boundary Line Determination

From a water supply point of view it isn't important where the boundary line is established. The shoreline is quite straight and, once past the bluff at the lakeshore, the land is quite flat. These factors make a boundary line 500-1,000 feet from the shoreline look reasonable. Most of the shoreline development appears to be vacation homes quite close to the lake. It should be noted that, since in many areas wells drilled for individual homes prove to be inadequate, the control of the spread of service areas into coastal zone areas can be a useful management tool.

C. Areas for Protection

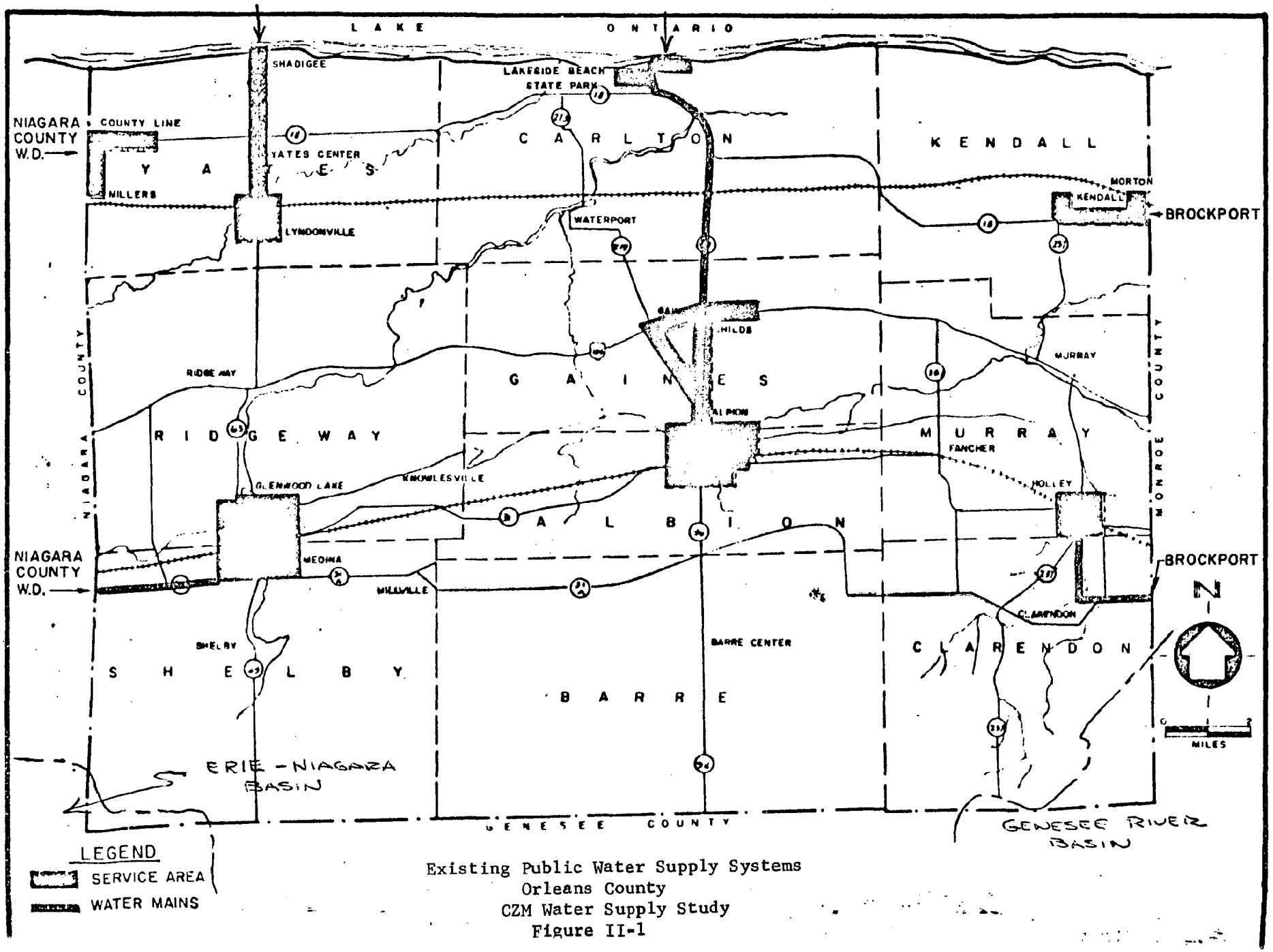
There are no aquifers of significance near the coast. The intakes for the Villages of Albion and Lyndonville are located on the lake. Watershed rules have been established for both systems and must be considered in coastal zone management.

TABLE II-1

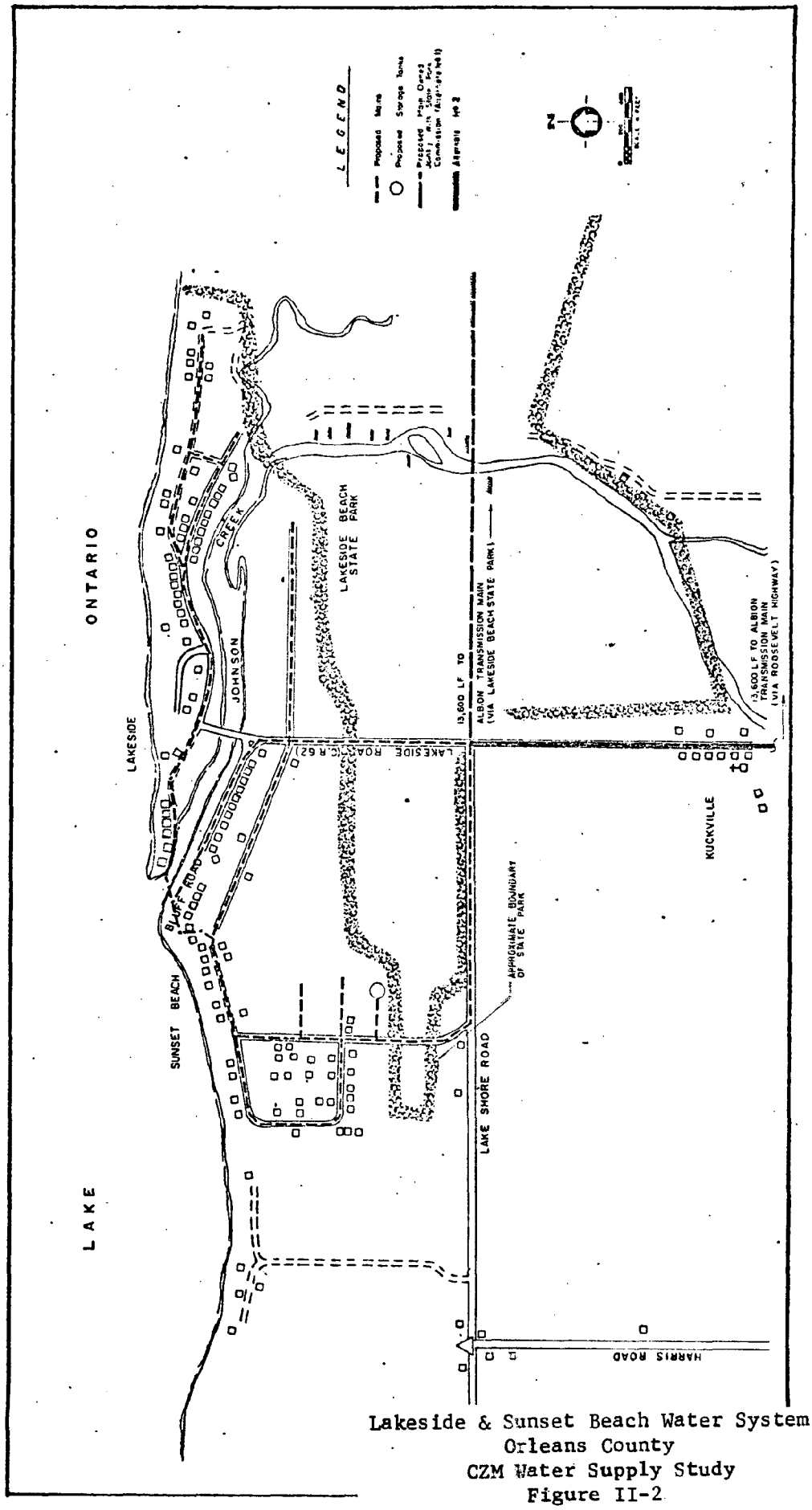
Existing Public Water Supply Systems

Orleans County

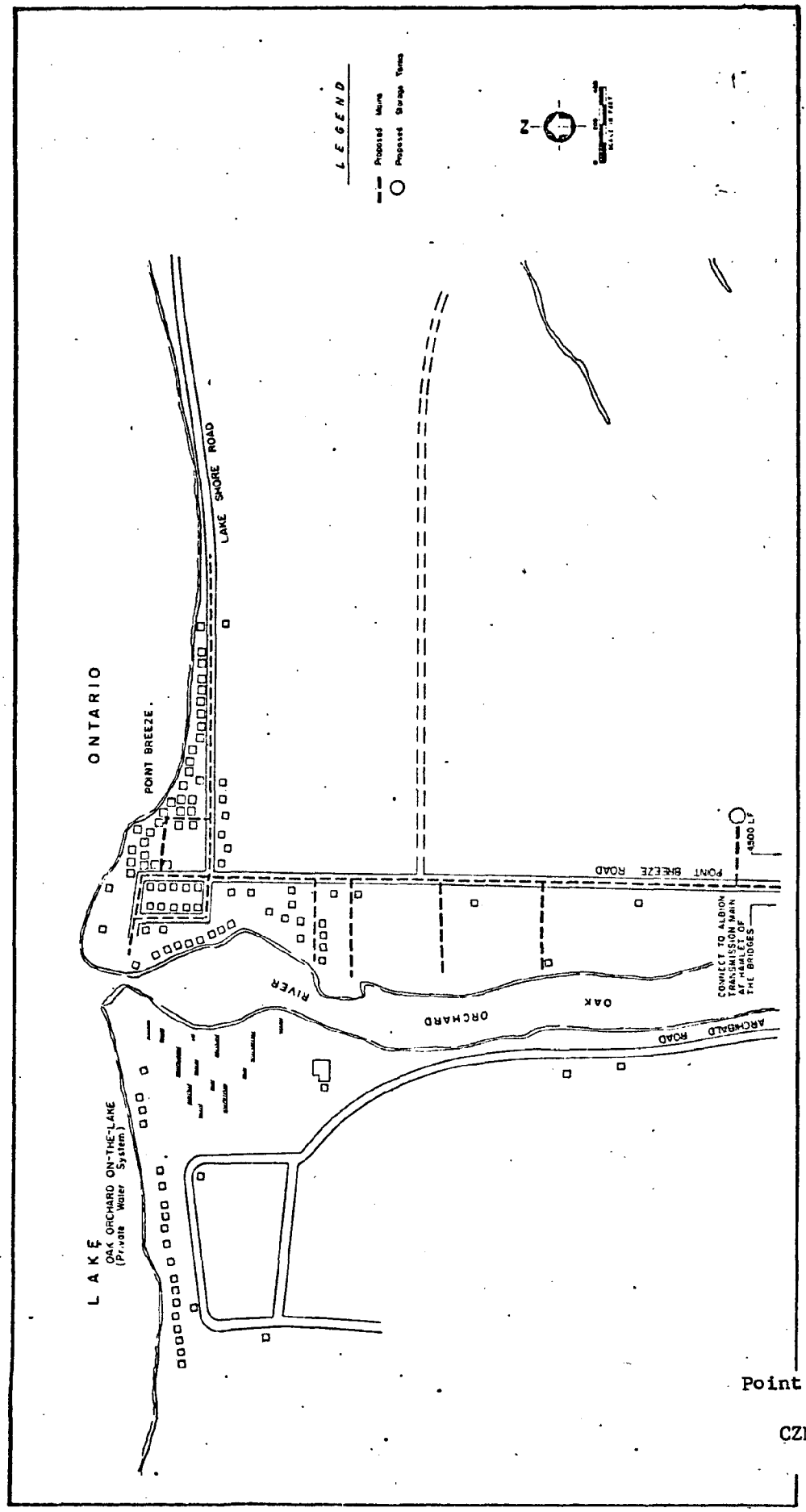
Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Albion	L. Ontario	2.0	1.10	2.00	3.10	Expansion of treatment plant by 1990
Lyndonville	L. Ontario	0.2	0.12	0.15	0.16	



Existing Public Water Supply Systems
Orleans County
CZM Water Supply Study
Figure II-1



Lakeside & Sunset Beach Water System
Orleans County
CZM Water Supply Study
Figure II-2



Point Breeze Water Systems
Orleans County
CZM Water Supply Study
Figure II-3

MONROE COUNTY

Monroe County is dominated by the City of Rochester. According to the 1970 census, 90% of the approximately 712,000 people living in the County resided within the City of Rochester and in the towns adjacent to the City.

The economy is heavily dependent upon the manufacture of instruments and machinery. The Eastman Kodak Corporation located in Rochester is the major employer in the county.

Latest available population projections from the Office of Planning Services indicate a county growth of about twenty-five percent, to about 900,000 by 1990. Most of this growth will occur in the suburban towns adjacent to Rochester. The Town of Webster, which borders Lake Ontario east of Rochester, is expected to experience substantial growth.

The land generally slopes up from the Lake Ontario shoreline, with the highest elevations along the County's southern border. There are several small bays on the Lake Ontario coast immediately west of Rochester. Irondequoit Bay, on the east side of Rochester, is quite large, extending about five miles southerly from the Lake into the interior of the County.

A considerable portion of Monroe County is drained by the Genesee River which runs northerly through the center of the county and empties into Lake Ontario at Rochester. There are no large lakes in the county.

Groundwater availability is highly variable throughout the county. Glacial outwash deposits in the present valley of the Genesee River and in its abandoned channels are the most productive sources in the basin. In many parts of the county, glacial till is the principal overburden and groundwater yields are low. The yields from bedrock are generally less than 20 gallons per minute. Much of the groundwater presently used for public water supply in the county is high in hardness and total dissolved solids.

A. Description of Public Water Supply Systems

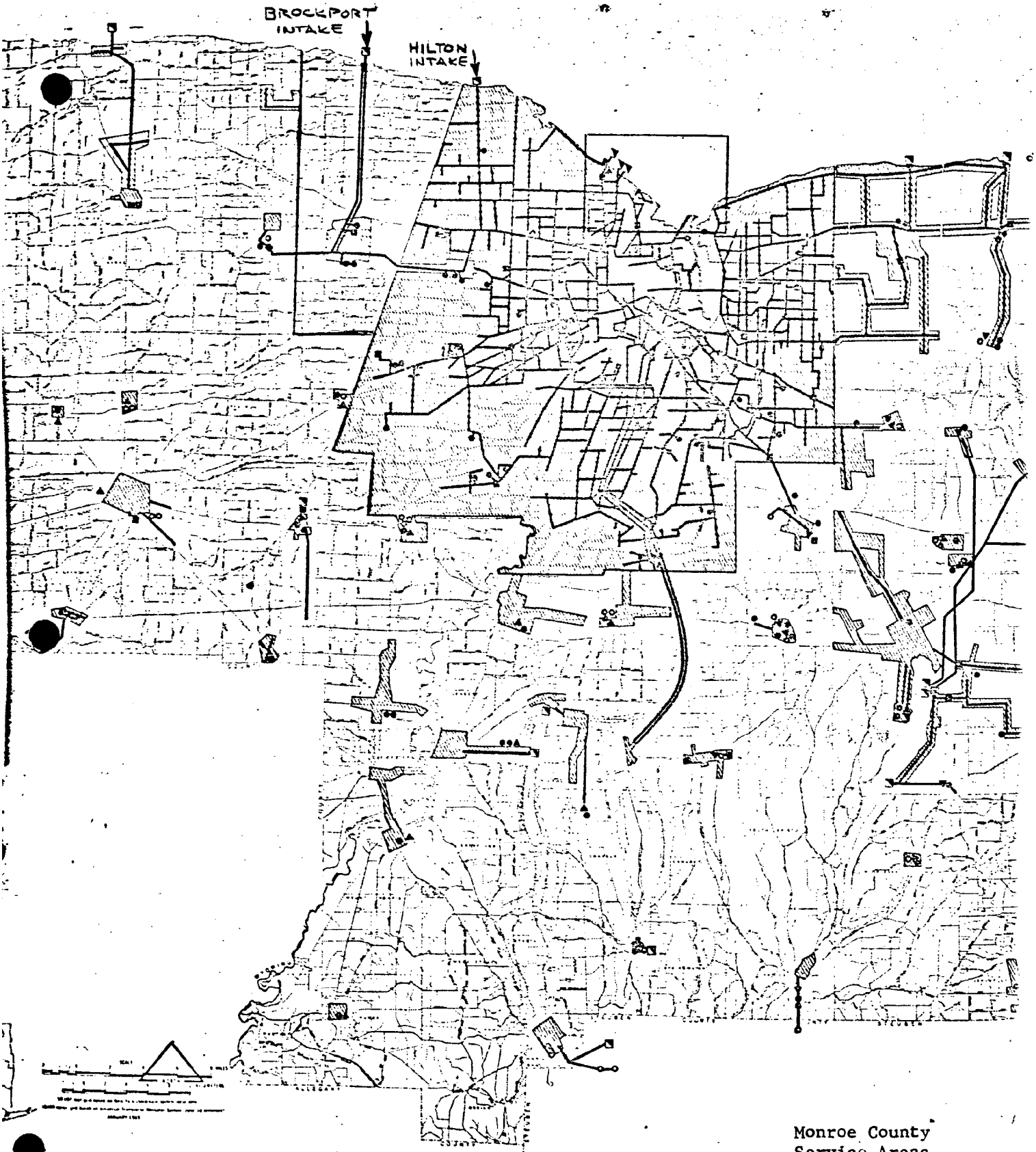
There are ten public water supply systems in Monroe County. By far, the two most important are the City of Rochester system and the Monroe County Water Authority (MCWA) system. These two systems served about 593,000 customers in 1970. The MCWA, being a county-wide entity, has a wide tax base and greater bonding authority than the village systems in the County. It is expected that the MCWA will be able to meet future needs of these smaller systems at a more economical price than they could by themselves. The MCWA is presently interconnected to seven of the other nine public water supply systems, there are public water supply systems in the County. Besides the two previously mentioned systems, there are public water supply systems in the Villages of: Brockport, Hilton, Webster, Fairport, Churchville, Pittsford, Spencerport and East Rochester. Following is a description of the Rochester, MCWA, Brockport, Hilton and Webster systems which have facilities affecting the coastal areas.

1. City of Rochester

Rochester takes its raw water supply from Lake Ontario and from Hemlock and Canadice Lakes located in Livingston and Ontario counties. The Lake Ontario supply is withdrawn through an intake shared with the Monroe County Water Authority and treated at a filtration plant located adjacent to Lake Ontario (See Figure II-4). Treatment capacity is rated at 36 mgd.

The upland supply consists of Hemlock and Canadice Lakes and a system of conduits connecting by gravity flow to the City system. The lakes have an estimated safe yield of 30 mgd. The conduit system capacity is 48 mgd.

The system capacity is more than adequate to meet present needs. The Monroe County Comprehensive Water Supply Study (V-A study) recommends the consolidation of City and Monroe County Water Authority production, transmission and storage facilities under the ownership and administration of the MCWA in order to insure the most economical supply of water.



Monroe County
Service Areas
CZM Water Supply Study
Figure II-4

2. Monroe County Water Authority (MCWA)

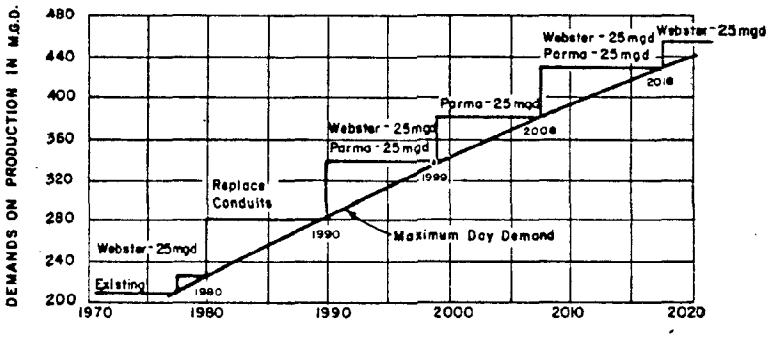
MCWA has two treatment plants, both of which take their raw water supply from Lake Ontario. The Authority's Shoremont Plant has recently been expanded to 75 mgd capacity. This plant shares its intake with the City of Rochester.

The Authority's second facility is the Beach Avenue Treatment Plant which was purchased from the New York Service Corporation in 1959. Presently this plant is used only as a peaking facility and is operated 8 to 10 days per year. Plant capacity is 12 mgd.

It is expected that the MCWA will be providing the bulk of future county water supply needs.

The Monroe County Comprehensive Water Supply Study has recommended a schedule of staged construction for the MCWA which includes two new intakes and treatment plants to be located on Lake Ontario.

TREATMENT PLANT STAGING PLAN

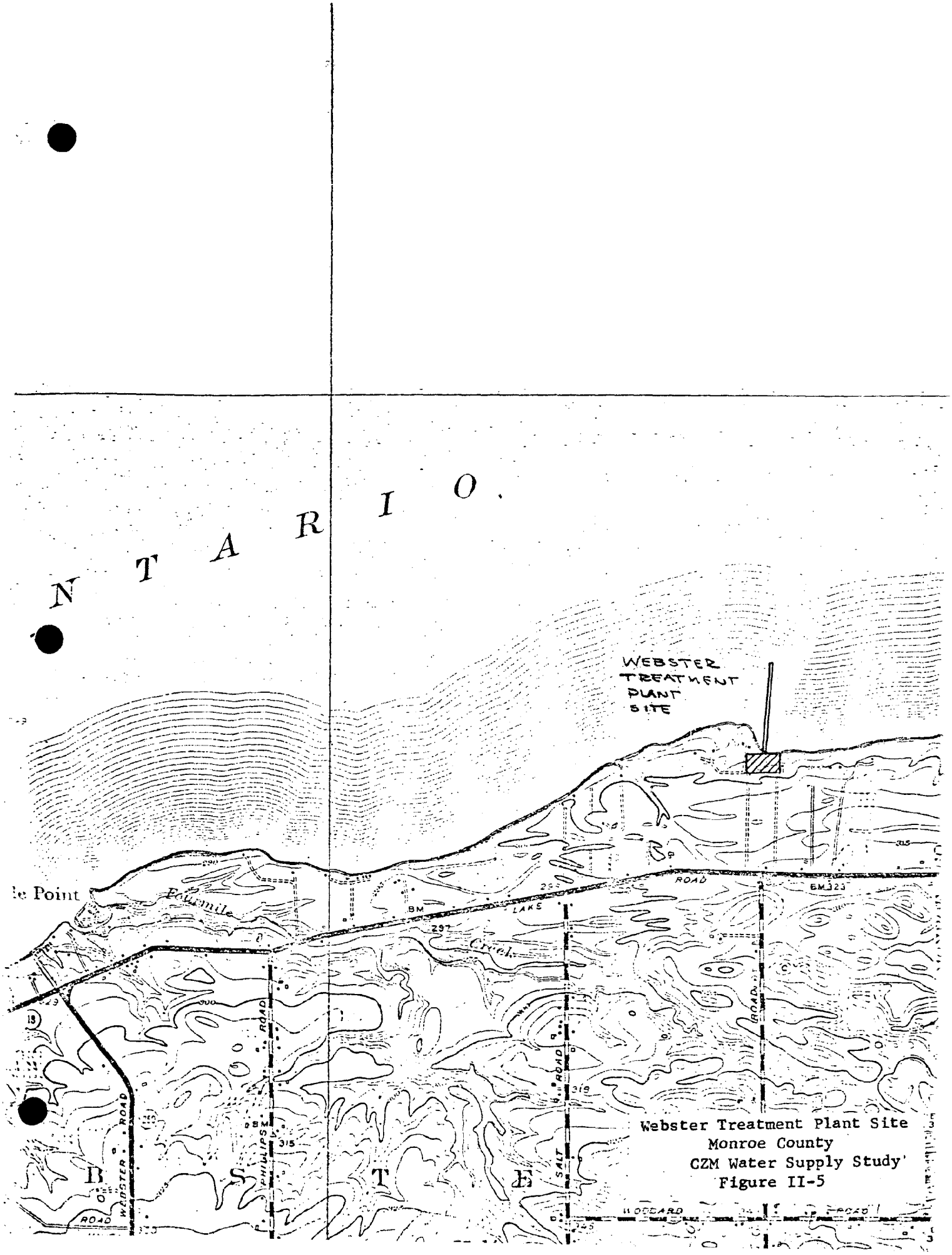


The locations of the proposed new Parma and Webster treatment plants are shown on Figures II-5 and II-6.

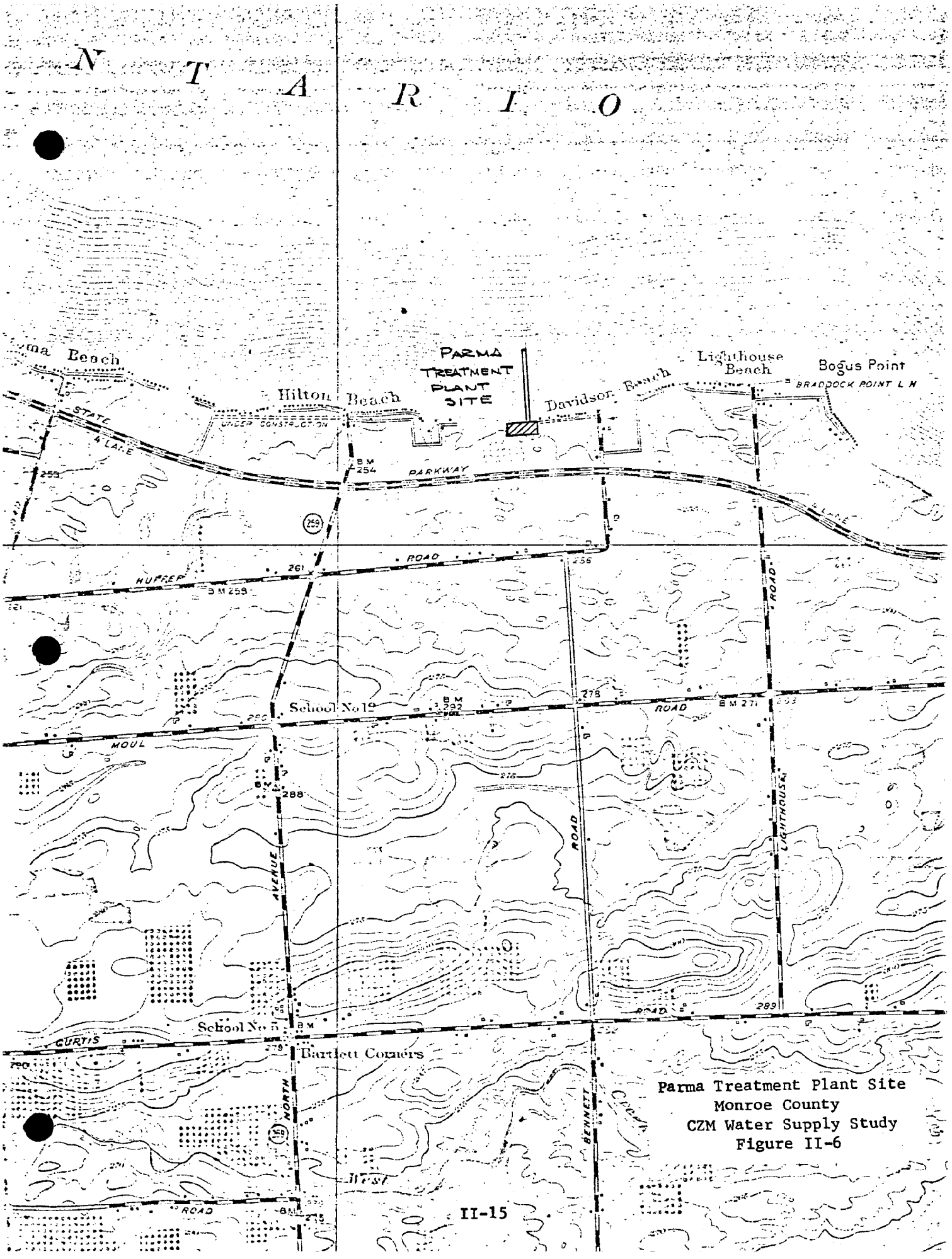
3. Village of Brockport

The Village of Brockport takes its raw water supply from Lake Ontario (see Figure II-4). The water is treated at a 5 mgd treatment plant and pumped approximately 11 miles to village.

Brockport supplies water to the Kendall-Hamlin Water District and supplies peaking needs to the Village of Holley. Both of these service areas are located in Orleans County. Present system capacity cannot meet



Webster Treatment Plant Site
Monroe County
CZM Water Supply Study
Figure II-5



Parma Treatment Plant Site
Monroe County
CZM Water Supply Study
Figure II-6

maximum daily demand. Additional water is purchased from the MCWA during periods of peak demand. Recommendations are for the Village to continue purchasing peaking water from the MCWA.

4. Village of Hilton

Hilton takes its raw water supply from Lake Ontario. The water is treated at the Village's 0.6 mgd treatment plant located near Hilton Beach. The plant is old and inadequate to meet maximum daily demand. The Village system is interconnected with the MCWA system. Recommendations are for the Village to phase out its existing plant and contract with the MCWA for the supply of all future requirements.

5. Village of Webster

Webster takes its raw water supply from twelve wells located adjacent to Irondequoit Bay in the western part of the Town of Webster. The reported safe yield of this supply is 10.5 mgd. Seven of these wells provide very poor quality water. Projections of service area demands indicate that Webster's existing supply facilities will be unable to meet maximum day demands within the next few years. The very poor quality of the water produced at several of the Village's wells suggest that they be abandoned. Recommendations are for the Village to proceed along this course and purchase supplemental water requirements from the Monroe County Water Authority.

Table II-2 summarizes the present and projected demands for the five water systems discussed above.

Self-Supplied Industrial Systems

The Eastman Kodak Corp. is a major industrial water user. Most of Kodak's processing water is self supplied. Kodak withdrew an average of 17 mgd from Lake Ontario in 1958. The location of Kodak's water supply intake in the Town of Greece is shown on Figure II-7. The Xerox Corporation has a new facility in the Town of Webster and is expected to become a major water user in the future. The exact location of this facility and the source of its water has not yet been determined. Rochester Gas and Electric Co. also has electric power generating facilities in the Towns of Greece and Webster which extract cooling water from Lake Ontario. Nuclear and conventional power facilities will be investigated under a separate task.

B. Boundary Line Determinations

From a water supply point of view, the only necessary consideration would be to include the water supply intakes along Lake Ontario. Locations of these intakes are shown on Figure II-4. To the west of the City of Rochester the Lake Ontario Parkway, a two lane divided highway, appears to be a logical boundary. East of Rochester, Lake Road runs close to the coast from Irondequoit Bay to the Wayne County Line.

C. Areas for Protection

The areas around municipal and industrial water supply intakes from Lake Ontario should be protected. Watershed rules have been enacted for: Rochester, MCWA (Shoremont facility) and Hilton. Additionally, if the MCWA expects to construct treatment plants at the Parma and Webster sites, as recommended in the Comprehensive Water Supply Study, these areas will require protection. The site of the proposed Webster plant, shown on Figure II-5, is now owned by the MCWA. The Parma site, shown on Figure II-6 would have to be purchased.

Irondequoit Bay is an important body of water from a recreation and geologic point. The Bay has pollution problems caused by wastewater and salt from winter road maintenance. The shoreline of the Bay should be included in the coastal zone management area.

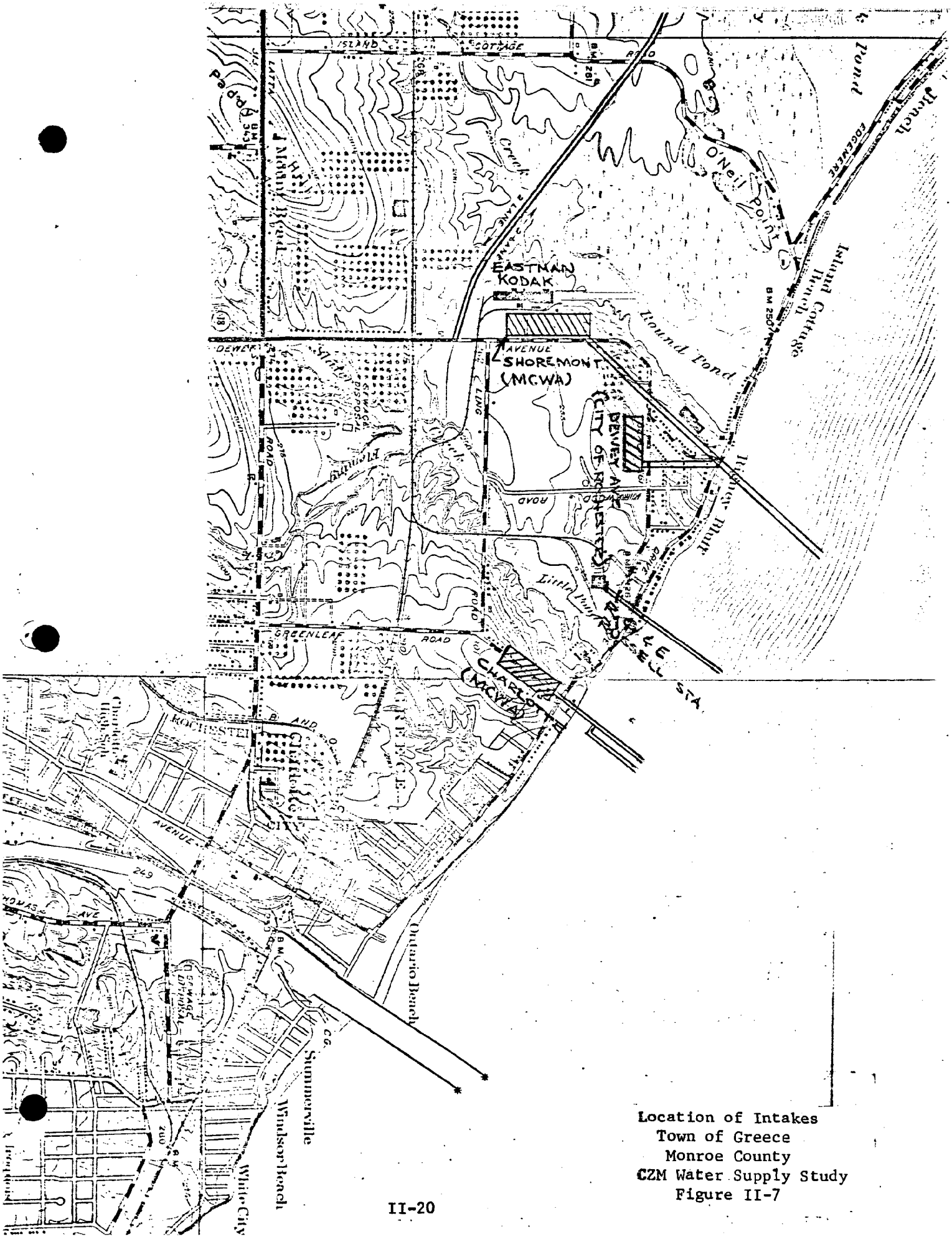
The well field for the Village of Webster is located adjacent to Irondequoit Bay . Watershed rules have been enacted. The well field should be included in the area of management.

TABLE II-2

Existing Public Water Supply Systems

Monroe County

Water System	Existing Sources & Capacity		Projected Demand (mgd)			Alternatives to Meet Future Needs
Water System	Sources	System Capacity (mgd)	1970	1990	2020	
Rochester	Lake Ontario	36	52.85	57.0	62.5	Purchase water from MCWA
"	Hemlock and Canadice Lakes	30				
Monroe Co. Water Authority	Lake Ontario	87	35.34	89	160	Additional withdrawals from Lake Ontario
Brockport	Lake Ontario	5	3.57	8.60	16.80	Purchase water from MCWA
Hilton	Lake Ontario	0.6	0.34	0.64	0.91	Purchase water from MCWA
Webster	wells	10.5	5.16	9.49	14.50	Purchase water from MCWA



Location of Intakes
Town of Greece
Monroe County
CZM Water Supply Study
Figure II-7

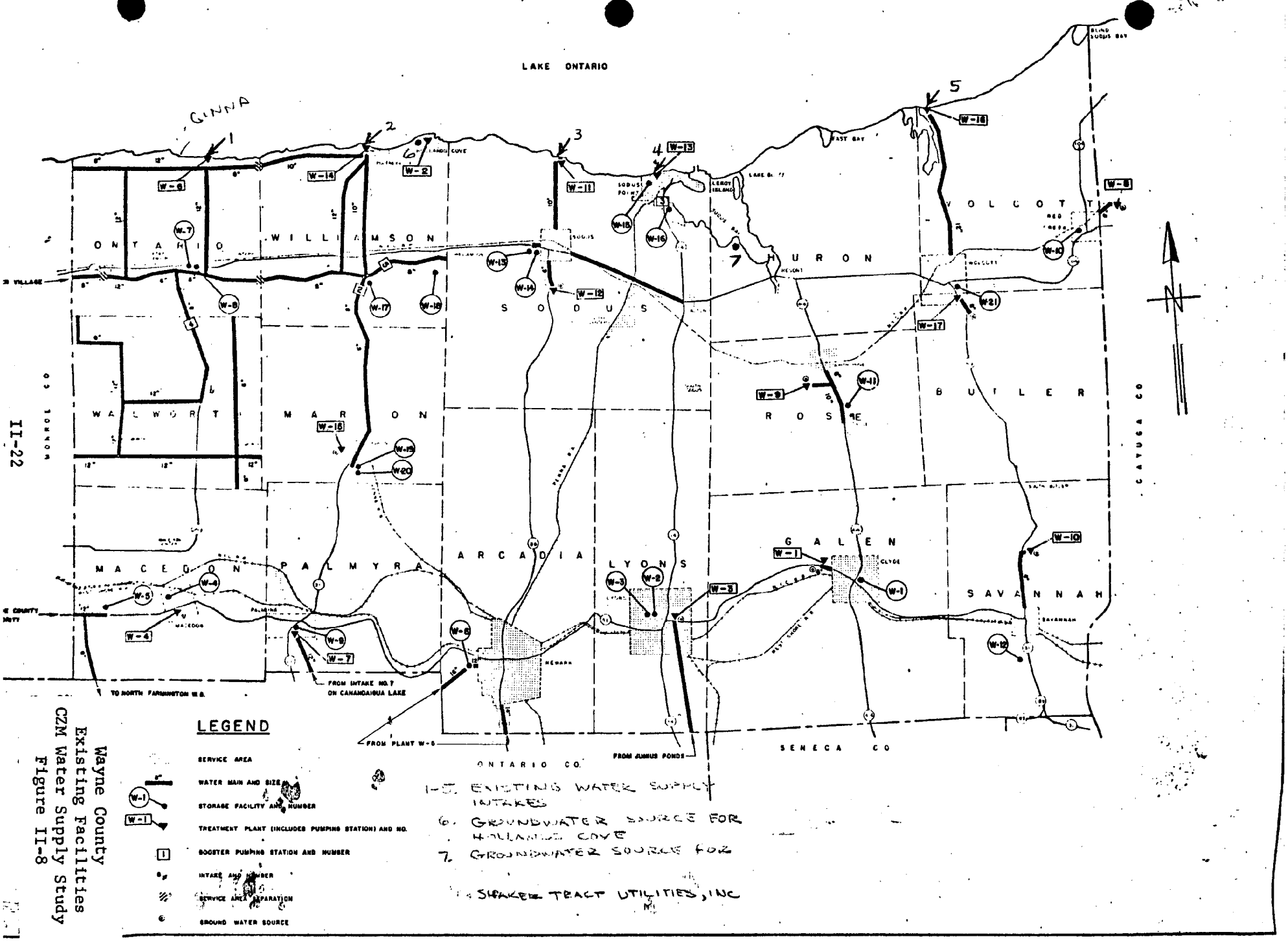
WAYNE COUNTY

Wayne County is mainly a rural-agricultural area. The major centers of population, Newark, Lyons, Palmyra and Clyde, are located in the southern half of the county. More than one-half of the land in the county is devoted to agricultural interests. Dairy and fruit farms are most numerous. Of the counties in New York State, Wayne is first in land in orchards and vineyards, second in the value of all farm products sold, third in acres of vegetables harvested for sale and fifth in farms with more than 400 chickens. Rainfall total and distribution is generally adequate so that very little of the farm acreage is irrigated.

A large food processing industry has established itself in Wayne County based on the large local farm output. These plants require large quantities of water for washing farm produce and packaging. Most of the water required by this industry is used in the fall months.

Orchards extend quite close to the Lake Ontario shoreline much of the distance between Sodus Bay and the Monroe County line. To the east of Sodus Bay, the shoreline becomes increasingly steep, with several bluffs noted on the topographic maps. From the shoreline the lake plain rises gradually to the south. The northern half of the county is drained by several small streams which empty directly into Lake Ontario. The coastline is fairly regular in the western half of the county. The eastern half is characterized by several bays and marshes which are typically separated from the Lake by a barrier beach.

There is a sizeable summer resident population along the coastline. The estimated 1966 population was 9,000. This is projected to grow to 13,000 in 1990 and 19,000 in 2020. Table 3 shows projected growth for resort areas along the coastline.



1-5. EXISTING WATER SUPPLY INTAKES

6. GROUNDWATER SOURCE FOR HOLLANDS COVE

7. GROUNDWATER SOURCE FOR SHAKER TRACT UTILITIES, INC

Wayne County
Existing Facilities
CZM Water Supply Study
Figure II-8

Groundwater is generally available in the county for individual well development although high hardness and iron content are common.

A. Description of Public Water Supply Systems

Wayne County has 22 individual systems serving roughly 60 percent of the County's 74,000 inhabitants. Of these, five use Lake Ontario as a source of supply. Most of the smaller systems utilize groundwater.

There are eight existing systems with either service areas or source of supply within the coastal area. A brief description of each follows.

1. Holland Cove

This is a resort village located on the coastline in the Town of Williamson. Summer resident population is about 230. The water supply system operates in the summer only. Source of supply is groundwater. Any additional source needs likely will be obtained from groundwater development.

2. Ontario Water District (including Walworth W.D.)

The Ontario Water District supplies all water districts in the Town of Ontario, except the West Ontario Water District, and all water districts in the Town of Walworth (see Figure II-8). Source of water is Lake Ontario.

3. Village of Sodus (including Sodus W.D.)

Approximately 4,400 people are served by this system. Lake Ontario is the main source of supply, with wells as an emergency supply.

4. Village of Sodus Point

The Sodus Point system served about 1,300 people in 1966. The Village supply is taken from Lake Ontario.

5. West Ontario Water District

The West Ontario Water District buys its water from the Village of Webster, Monroe County. The system served 380 people in 1966.

6. Williamson Town Water District

The Williamson Town W.D. includes all water districts in the Town (Williamson, East Williamson, Pultneyville, Ridge Chapel and West Ridge Water Districts) and the Marion Town Water District. Lake Ontario is the source of supply.

7. Village of Wolcott

The Village of Wolcott has a treatment plant on Lake Ontario. The system served 1,640 people in 1966.

8. Shaker Tract Utilities, Inc.

This is a private water supply system serving the Shaker Heights subdivision located on the west side of Sodus Bay in the Town of Huron (see Figure II-9). Source of supply is groundwater. The system supplied an average 11,000 gallons per day to 175 people in 1974.

The Report on Comprehensive Public Water Supply Study for Wayne County recommends an intermunicipal development plan for much of the county, including all of the coastal area. The plan recommends interconnection of existing systems and development of additional capacity in order to permit expansion of service areas and to absorb growth in demand. Principal features include phased expansion of the Town of Williamson treatment plant and phase-out of plants of the Ontario Water District and Villages of Sodus, Sodus Point and Wolcott. Project phasing is shown on Figure II-10. The system would be administered by a County Water District.

Table 4 summarizes available information on present and projected demands on the above seven systems.

B. Boundary Line Determination

The determination of boundary line location in Wayne County should follow careful study of the shoreline. In some places, bluffsborder the coastline. In other places, bays and wetlands cut deep into the interior of the County. The areas recommended for protection should be included in the management area, if possible.

C. Areas for Protection

There are no important aquifers near the coastline except for the groundwater sources of the Holland Cove and Shaker Tract Utilities, Inc., water supplies. These aquifers should be protected. The five withdrawal points and the accompanying filtration plants should be included in the management area.

TABLE II-3

Summer Residents - Wayne County (1)

Location	1966	1990	2020
Lake Ontario			
Ontario Town			
Bear Creek	370	520	780
Remainder of Town	370	520	780
Williamson Town			
Hollands Cove	230	320	480
Remainder of Town	700	980	1,500
Sodus Town Western Shoreline	330	460	690
Camp Beechwood	200	280	420
Sodus Point Village	1,800	2,500	3,800
Sodus Bay			
Lake Bluff	420	590	880
LeRoy Island	500	700	1,100
Remainder of Sodus Bay (2)	1,580	2,200	3,300
East Bay	560	780	1,200
Port Bay	1,750	2,400	3,700
Blind Sodus Bay	280	390	590
Total	9,090	13,000	19,000

(1) Average number of residents in addition to year-round population at recreational areas on weekends during the summer

(2) Centered around the hamlet of Resort

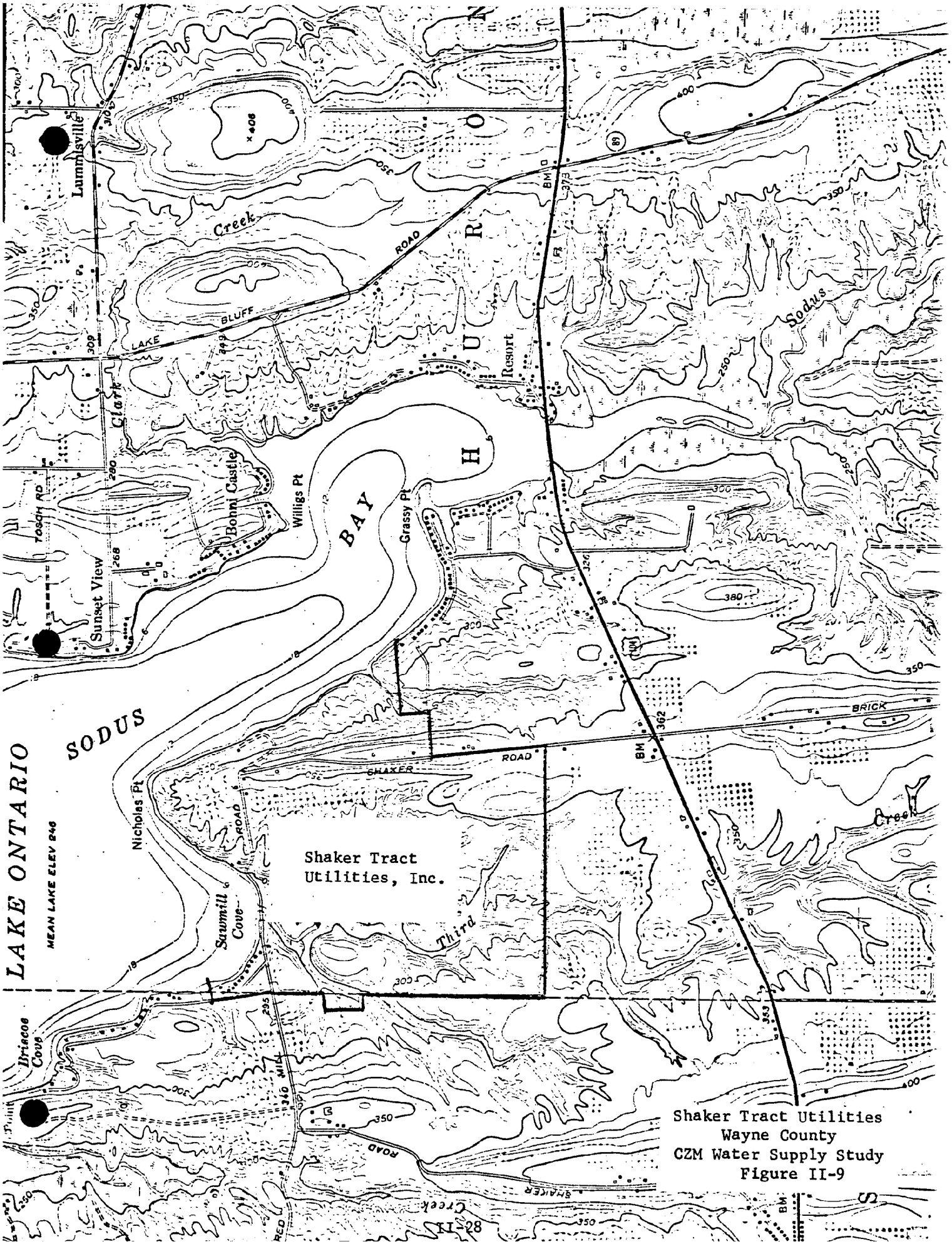
Source: Wayne County Comprehensive Water Supply Study

TABLE 4

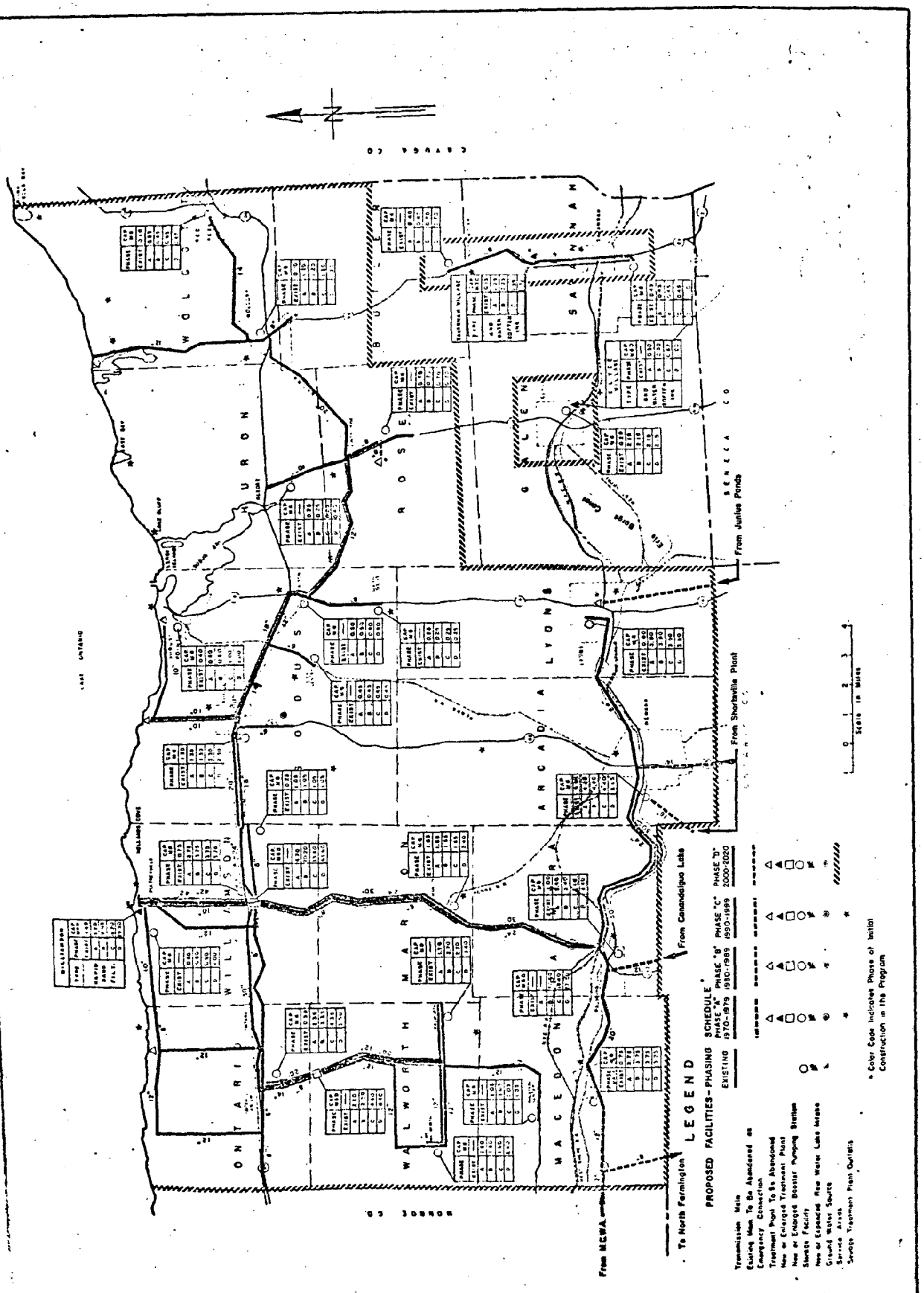
Existing Public Water Supply Systems

Wayne County

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1966	1990	2020	Alternatives to Meet Future Needs
Holland Cove	Groundwater	0.03	0.01	0.01	0.03	Increase groundwater withdrawals
Ontario W.D.	Lake Ontario	1.53	0.32	N.A.	N.A.	Either interconnection of systems, as outlined in the Wayne County Comprehensive Water Supply Study, or continue present Lake Ontario withdrawals
Sodus (V)	Lake Ontario & wells	1.64	0.50	N.A.	N.A.	
Sodus Point(V)	Lake Ontario	0.75	0.12	N.A.	N.A.	
Williamson W.D.	Lake Ontario	2.50	1.10	N.A.	N.A.	
Wolcott (V)	Lake Ontario & springs	1.00	0.30	N.A.	N.A.	
Shaker Tract Utilities, Inc.	Groundwater	0.13	0.011	N.A.	N.A.	
West Ontario W.D.	Webster, Monroe Co.	-	N.A.	N.A.	N.A.	Continue to meet needs by purchasing water from Village of Webster



Shaker Tract Utilities
Wayne County
CZM Water Supply Study
Figure II-9



Recommended Project Phasing
Wayne County
CZM Water Supply Study
Figure II-10

CAYUGA COUNTY

There is only about eight miles of Lake Ontario shoreline in Cayuga County. The major feature is Little Sodus Bay located near the Wayne County line. Major stream tributaries which enter Lake Ontario along the coastline are Sterling Creek and Ninemile Creek. Fair Haven Beach State Park is located immediately east of Little Sodus Bay and occupies a little more than one mile of coastline. The coastline consists of a series of drumlins separated by marshes which extend inland along streams. Barrier beaches generally front the marshes.

A. Description of Public Water Supply Systems

The Village of Fair Haven, on Little Sodus Bay, is the only community water supply system presently affecting the coastal area. The Onondaga County Comprehensive Water Supply Study recommends that the Onondaga County Water District construct an intake and treatment plant of West Nine Mile Point sometime around 2020 to meet anticipated demand (See Figure II-11)

1. Village of Fair Haven

The source of supply is well field located east of the Village near a tributary of Sterling Creek. Fair Haven is a resort community with a large influx of summer visitors. The largest user of the Village system is the Fair Haven Beach State Park. The ratio of maximum daily demand to average daily demand is 3.6 to 1. The present source should be adequate through 1990. Additional groundwater development would likely be the least expensive means of increasing supply.

2. Onondaga County Water District (OCWD)

See Oswego County for a system description.

B. Boundary Line Determination

There are neither public water supply sources nor aquifers near enough to the coastline to influence boundary line determinations. The service area of the Village of Fair Haven, shown on Figure II-12encircles Little Sodus

Bay and serves the State Park.

C. Areas for Protection

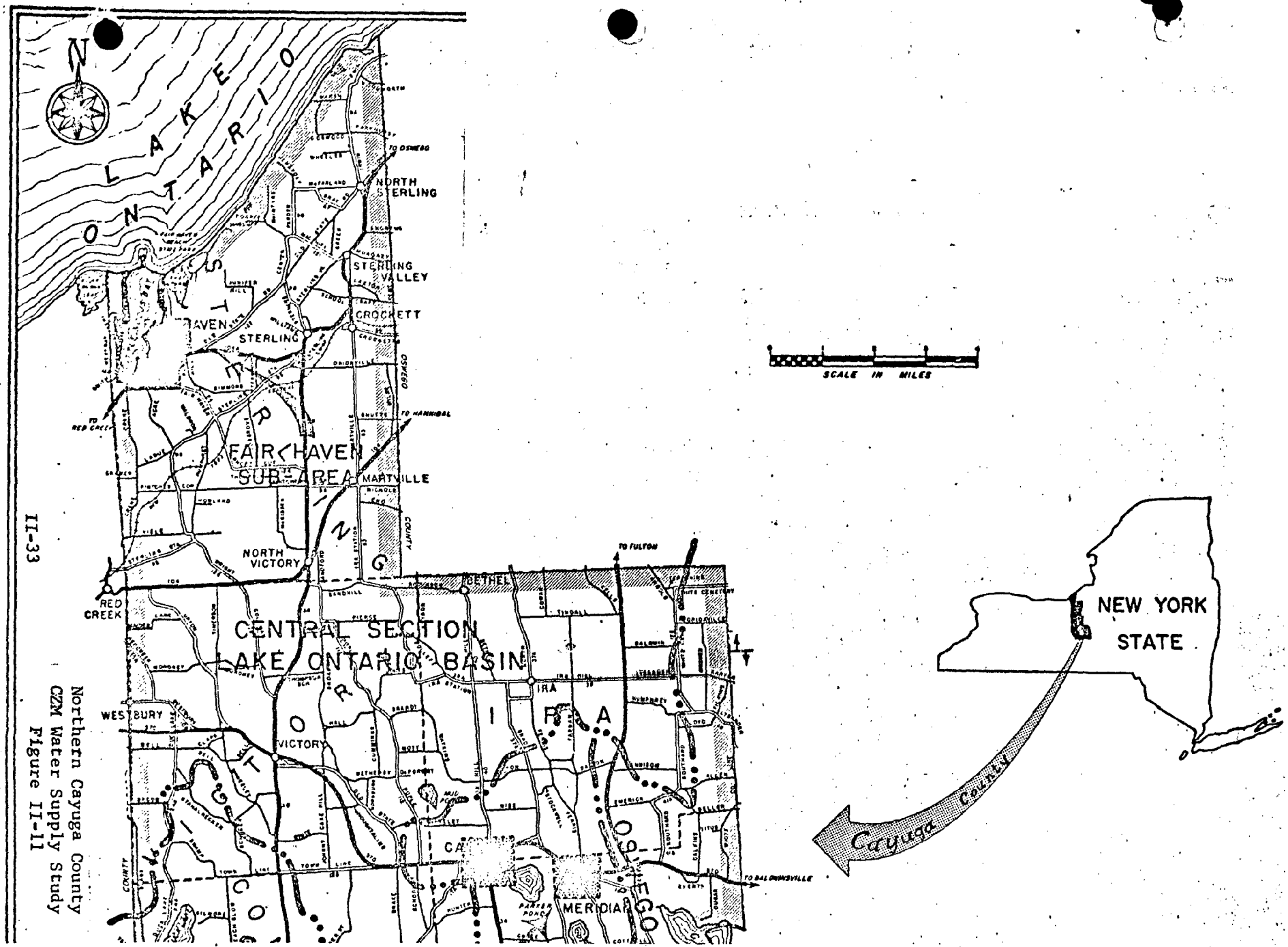
Fair Haven's well field is located 3,700 feet distant and 20 feet higher than the coastline; too far away to warrant consideration. The Onondaga County Water District should be contacted to determine whether they have any firm plans to purchase the West Nine Mile Point site.

TABLE II-5

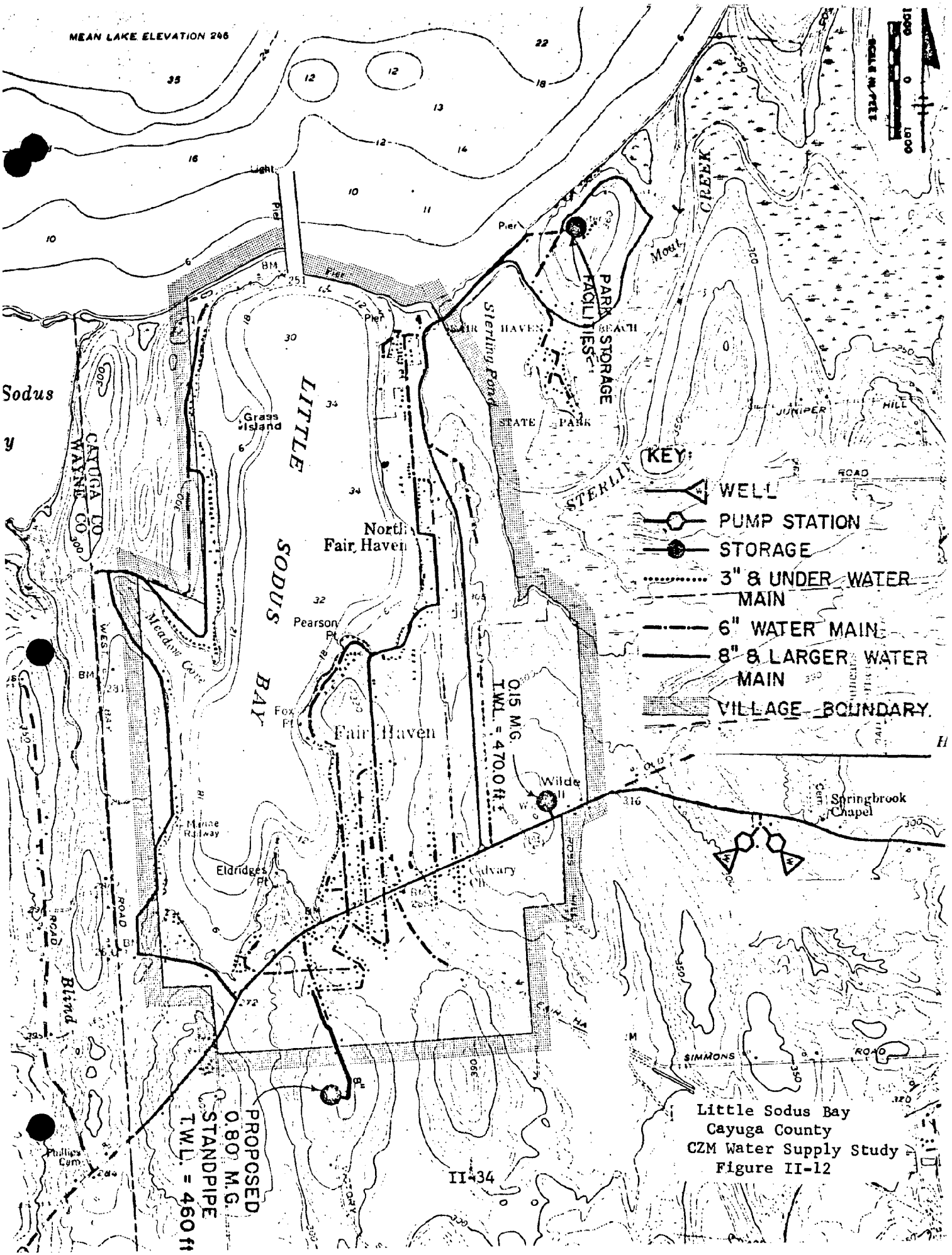
Existing Public Water Supply Systems

Cayuga County

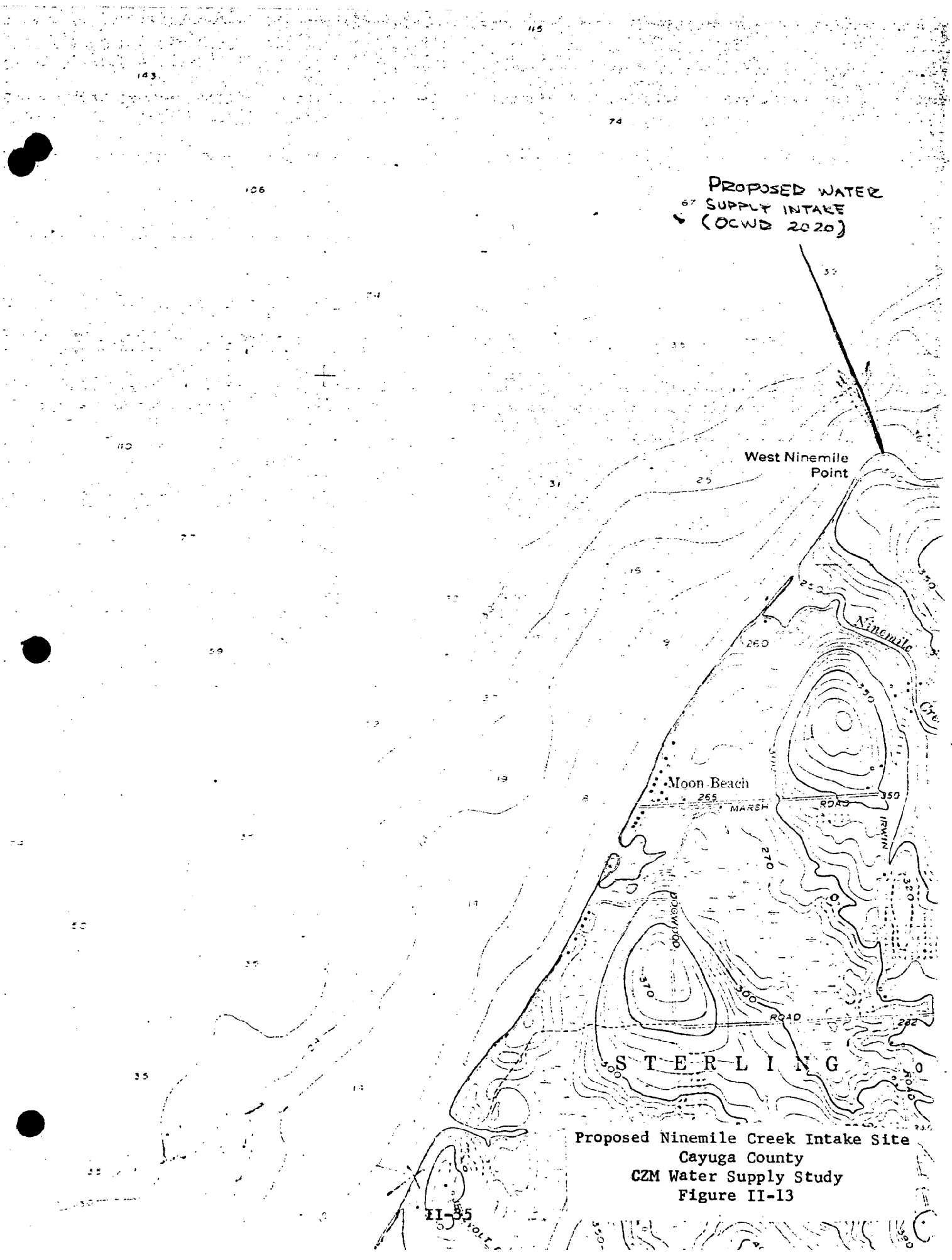
Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Fair Haven	Groundwater	0.505	0.075	0.140	0.290	Additional ground water



Northern Cayuga County
CZM Water Supply Study
Figure II-11



Little Sodus Bay
Cayuga County
CZM Water Supply Study
Figure II-12



Proposed Ninemile Creek Intake Site
Cayuga County
CZM Water Supply Study
Figure II-13

OSWEGO COUNTY

The center of population and commercial activity in Oswego has traditionally been the City of Oswego. However, the City of Syracuse is having increasing influence on the population trends and on employment in the county. The combination of the movement to suburbia and improved road access from Syracuse is causing a substantial population growth on the corridor between Syracuse and Oswego. Population projections indicate a county growth rate substantially higher than the State average during the next 25 years. In addition to this, new industries have settled in the county, making the employment outlook, over the long term, bright.

The only urbanized area of the Lake Ontario coastline is in the City of Oswego. Oswego, at one time, was a major Great Lakes port. Although the amount of cargo tonnage handled has decreased substantially in the last hundred years, the port continues to generate a considerable amount of commercial and industrial activity along the adjacent coastline.

The Lake Ontario coastline in Oswego County has a variable topography. West of the City of Oswego it consists of a series of drumlins trending in a general north-south direction, separated by marshes that extend several miles inland along small creeks. The drumlins range up to 150 feet above lake level and one-quarter to one-half mile wide at their base.

For about 13 miles east of the Oswego River, the shore bluffs are from 5 to 25 feet high. From there to the Salmon River the shore contains occasional reaches of high ground separated by marsh areas that are fronted by barrier beaches.

The remaining Oswego County shoreline north of the Salmon River is generally a barrier beach and sand dunes up to 45 feet high, separating either marsh areas or open ponds from the lake.

The major stream system in the county is the Oswego River, which enters Lake Ontario at the City of Oswego. Other streams draining portions of the County are the Salmon River, Little Salmon River, Little Sandy Creek and Grindstone Creek.

Selkirk Shores State Park is located on the Lake Ontario coastline in the Town of Richland, between the outlets of the Salmon River and Grindstone Creek. The Office of Parks and Recreation proposes expansion of the park in its Statewide Comprehensive Recreation Plan. Harbors of Refuge are also proposed by OPR for Mexico Point and Port Ontario.

There are two electric power generating plants on the coastline in Oswego County, both operated by the Niagara Mohawk Power Corps. The Oswego station, located in the City of Oswego, uses fossil fuels. The Nine Mile Point Station in the Town of Scriba, is nuclear powered.

A. Description of Public Water Supply Systems

There are two public water supply systems which affect the Lake Ontario coastline in Oswego County.

1. City of Oswego

The City takes all of its public water supply from Lake Ontario. It has an intake on the coast located just west of the Oswego River. The intake structure is at the end of an eight-foot diameter tunnel which extends 6,250 feet off shore in about 54 feet of water. The intake is shared with the Onondaga County Water District, which is allowed to withdraw up to 62.5 mgd. The water receives only chlorination and fluoridation before use. The City is under orders, issued by the Water Resources Commission, to filter its water supply. Pumping capacity is expected to be sufficient to meet need through 2020.

The City system also serves part of the adjacent towns of Oswego, Minetto, Scriba and Volney. The present service area and the likely 1990 and 2020 areas served are shown on Figure II-14. Industries served include the Alco Aluminum Co. and the Niagara Mohawk Nine Mile Point facility in the Town of Scriba and the Hammermill Paper Company in the City of Oswego.

2. Onondaga County Water District (OCWD)

OCWD, which is administered by the Metropolitan Water Board, takes its water supply from Lake Ontario. The District has a contract with the City of Oswego to take up to 62.5 mgd from Oswego's Lake intake. The water is pumped to a filtration plant located south of Oswego and then transmitted to Onondaga County. At present, OCWD has two customers, the Onondaga County Water Authority and the City of Syracuse. However, other municipalities in both Onondaga and Oswego Counties are expected to purchase water from this system in the future.

The Onondaga County Comprehensive Public Water Supply Study has recommended an expansion plan to meet an expected large growth in demand. The study predicts that the Onondaga County service area demand in 1990 and 2020 will be 139 mgd and 223 mgd, respectively. The study recommends that Lake Ontario supply 73 mgd in 1990 and 155 mgd in 2020.

It is recommended that the existing pumping facilities at the City of Oswego intake be expanded to the 62.5 mgd allowable capacity, that a new intake be built on Lake Ontario at Burt Point which is located about 1.5 miles west of the existing intakes, and that the treatment plant located south of Oswego be expanded. These facilities are recommended for construction prior to 1980. For 1990 further expansion of pumping, treatment and transmission facilities are recommended.

For 2020 the construction of a third Lake Ontario intake, located at West Nine Mile Point in Cayuga County, is recommended. A water treatment plant would also be constructed at the site.

The service areas and sources of supply of other water supply systems in the county are all located more than one mile from the coastline. None of these systems are expected to seek a source of supply within one mile of the coastline in the future.

B. Boundary Line Determination

The existing City of Oswego and Onondaga County Water District pumping stations, located on the coastline at Oswego, should be included in the coastal zone management area. If the Onondaga County Water District plans to construct pumping and treatment facilities at Burt Point, Oswego County, and West Nine Mile Point, Cayuga County, these areas should also be included in the management area.

C. Areas for Protection

There are no important aquifers within the coastal area which require special protection. No new water supply systems are expected to be established within a mile of the coastline in the next 45 years. It is expected that the City of Oswego system will serve more of the coastal area as time passes. The only water supply system expected to seek new source supply in the coastal area is the Onondaga County Water District. Burt Point, located 2 miles west of Oswego, has been identified in the Onondaga Comprehensive Water Supply Study as a possible location for a new water supply intake around 1990. The District should be questioned to determine whether they have any firm plans for this site. If they do use of the area adjacent to the site should be regulated to exclude uses which would be incompatible to the intake facility.

The existing City of Oswego intake is located far out into Lake Ontario, 6,250 ft No watershed rules have been established. The location of its pumping station

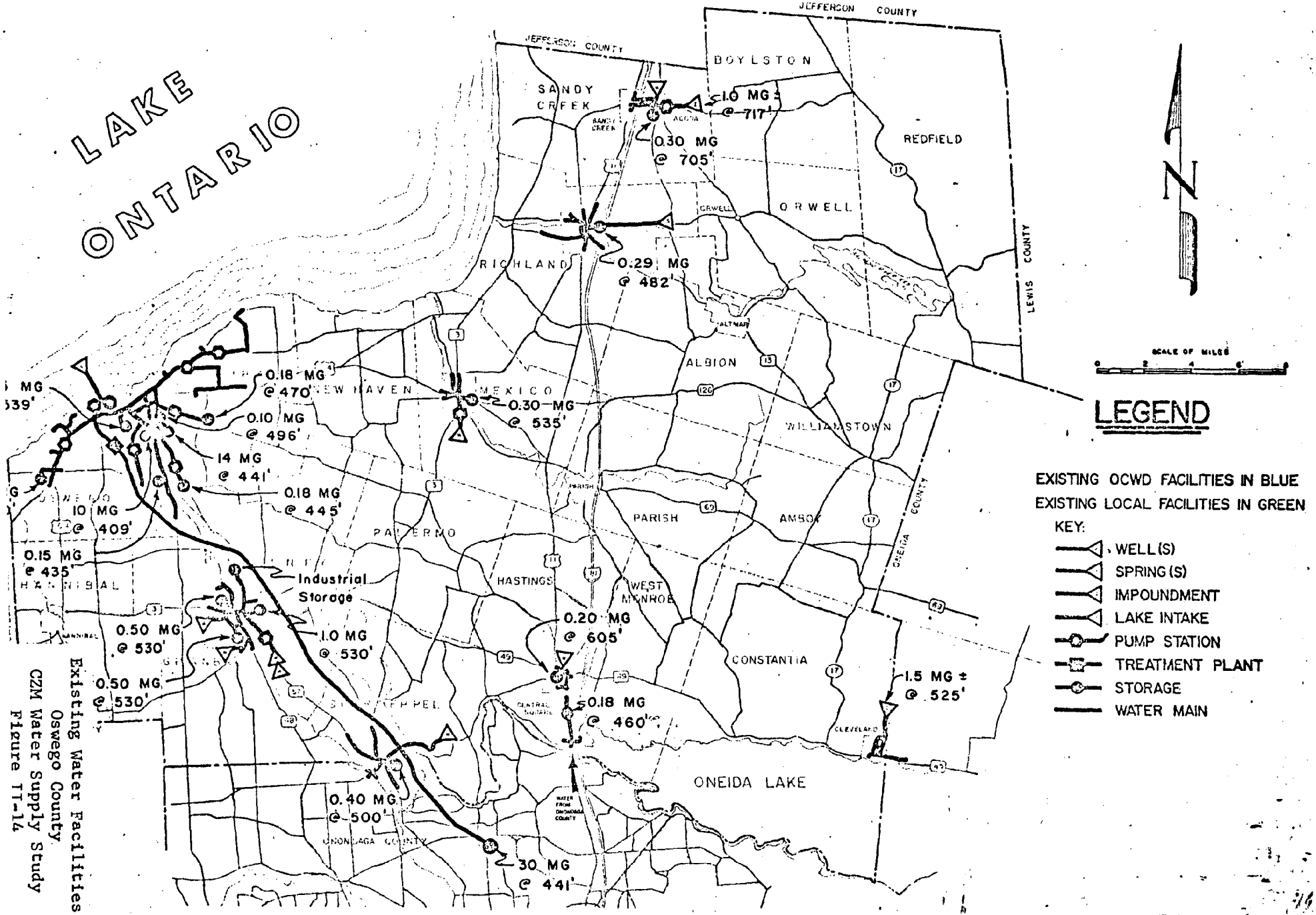
and the adjacent OCWD pumping station should be considered in the course of establishing land use regulations for the adjacent area. The City of Oswego is under court orders to filter their water supply. They should be consulted to find out whether they have a site near the coastline under consideration for a treatment plant.

TABLE II-6

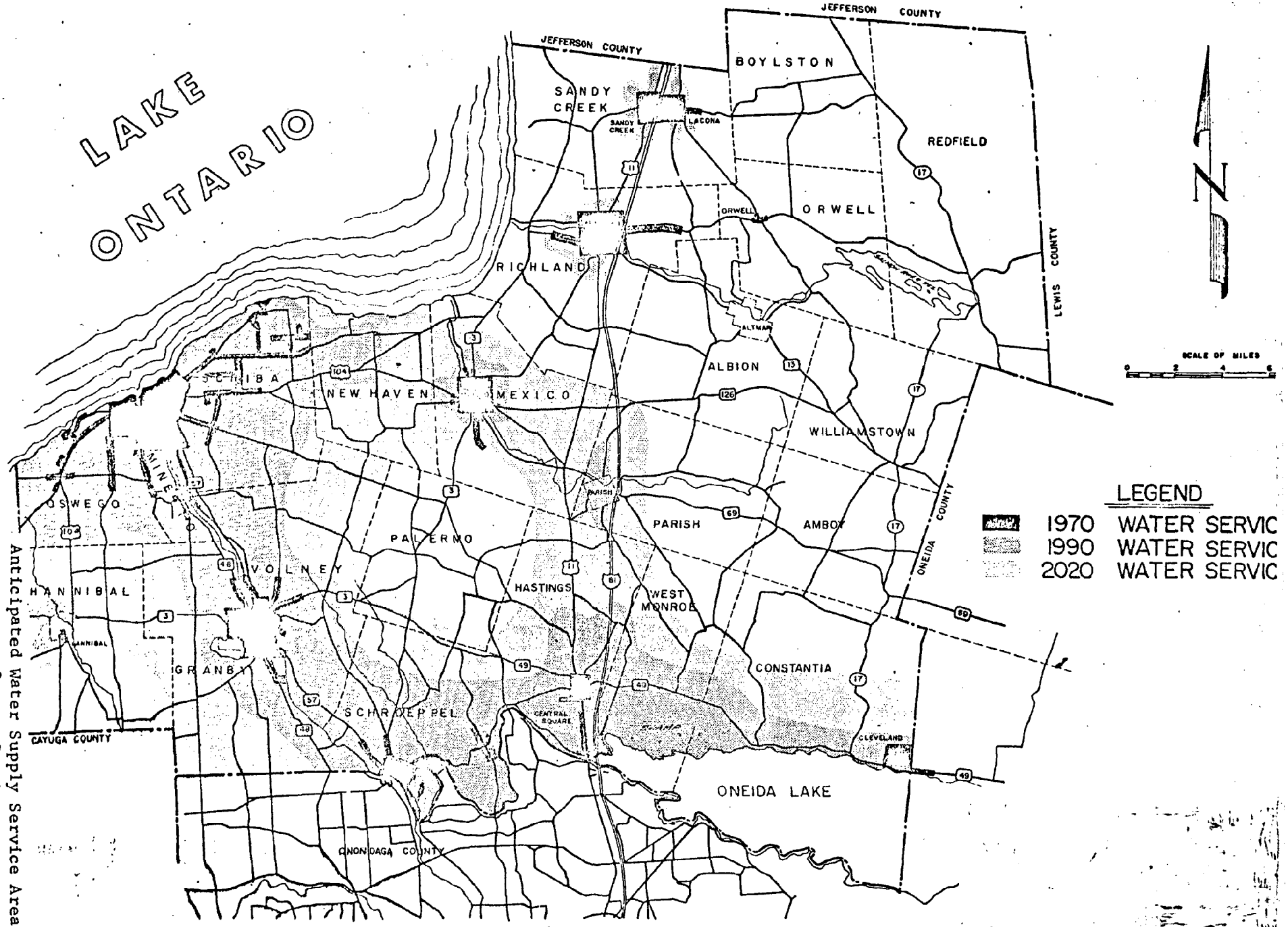
EXISTING PUBLIC WATER SUPPLY SYSTEMS

OSWEGO COUNTY

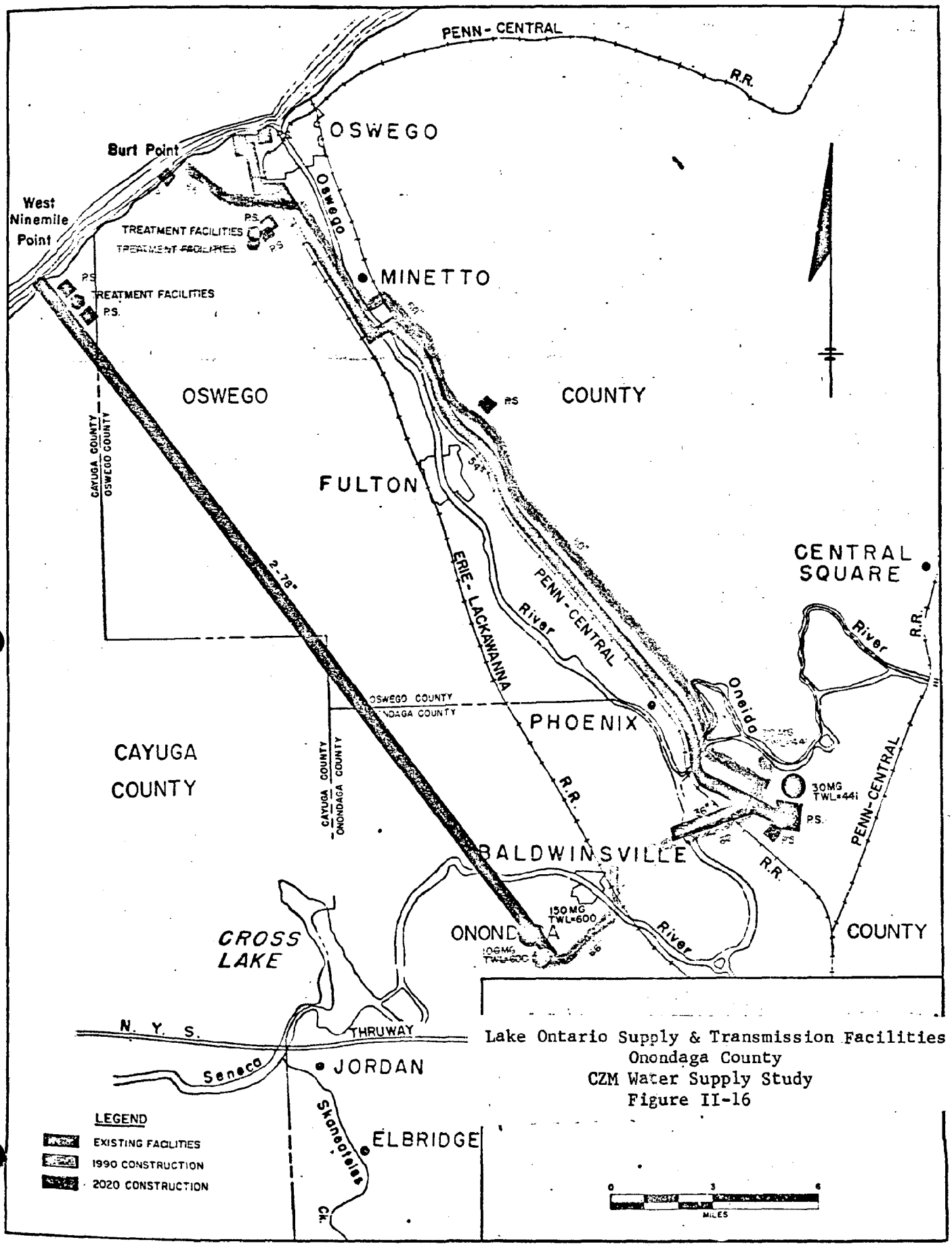
Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1974	1990	2020	Alternatives to Meet Future Needs
Oswego (c)	Lake Ontario	34.0	10.00	16.02	25.72	
Onondaga Co. Water District	Lake Ontario	25.0	9.42	73.02	154.59	Two new intake sites on Lake Ontario at Burt Pt., Oswego County, and West Nine Mile Point, Cayuga Co.



Existing Water Facilities
Oswego County
CZM Water Supply Study
Figure TT-14



Anticipated Water Supply Service Areas
Oswego County
CZM Water Supply Study
Figure II-15



Lake Ontario Supply & Transmission Facilities
Onondaga County
CZM Water Supply Study
Figure II-16

JEFFERSON COUNTY

The coastal area of Jefferson County is heavily oriented to recreation. There are 15 State Parks along either Lake Ontario or the St. Lawrence River which occupy a total of 3,800 acres of the coastline. In addition, there are several town and village parks along the coast. The northern half of the county borders the Thousand Islands area, famous for its scenery and recreational opportunities. The Villages of Cape Vincent, Clayton and Alexandria Bay are major recreation centers and have large population increases during the summer. This puts a burden on their water supply systems. Average daily demand increases about fifty percent during this time.

The shore of Jefferson County, between the Oswego-Jefferson County line and Tibbett's point at the head of the St. Lawrence River, is very uneven and contains several deep bays and prominent headlands. The total length of the shore is about 120 miles. For 10 miles north from the Oswego County line, a barrier beach and sand dune extend in nearly a straight line, separating marsh areas and small ponds from the open lake. At the end of the 10-mile reach, the shore characteristics change abruptly. Rock outcrops at the water's edge and rises gradually to a height of about 75 feet on the west side of Stony Point. It then falls gradually as the shore continues around Stony Point into Henderson Bay. From Henderson Bay to Tibbett's Point the shoreline is very irregular with deep bays predominating. Some of the bays have marsh areas at their inner end.

The shoreline along the St. Lawrence River section of Jefferson County is quite variable in relief. There is little beach area and rock is very close to the surface. As the name, Thousand Islands implies, there is a multitude of islands of all sizes dotting the River in this reach.

The major streams cutting across the coastal areas in Jefferson County are Sandy Creek, Stony Creek, Black River, Perch River and Chaumont River.

Jefferson County, except for some isolated areas, is not lacking in groundwater resources. The groundwater for individual use is obtained principally from wells drilled in bedrock. Surficial deposits are usually too thin to

support a water table. Buried glacial channels are a possible source of groundwater locally. The water is generally of good quality but hard. Excess iron, sulphur and salt are problems locally. The problem areas of the county seem to be principally those covered by lacustrine clays found in the Towns of Cape Vincent, Henderson and Hounsfield.

A. Description of Public Water Supply Systems

There are ten public water supply systems in Jefferson County near the coastline. The largest system is that of the City of Watertown which serves about 34,000 people as well as several industries. The remaining nine systems are small, with demand less than 0.5 mgd. Six of the systems take their source of supply from Lake Ontario or the St. Lawrence River. Following is a description of the existing water supply systems, their present and projected needs and suggested alternatives for meeting needs.

1. City of Watertown

The City takes its water supply from the Black River, near its eastern boundary. The treatment plant is over 60 years old. The Jefferson County Comprehensive Public Water Supply Study recommends that Watertown and the adjacent communities of Brownville, Glen Park and Dexter join together in a regional system. Several alternative schemes of supplying the system are presented. All include either Lake Ontario or the Black River as a source. Figure II-13 shows the locations of withdrawal sites that were examined in the alternative schemes.

The Study recommended that a County, Water District be formed to supply Watertown, Brownville, Glen Park, Dexter and portions of the towns of of Watertown, Pamelia, Brownville and Hounsfield. The Black River would be the source of supply and the existing Watertown treatment plant would supply the treated water. Around 1990, a new treatment plant would be needed. Figure II-17 shows the projected 1990 and 2020 service areas.

2. Village of Sackets Harbor

The Village obtains its water from Lake Ontario through an intake located on the shore southwest of the Village (see Figure II-18) The water is treated before use. The supply is expected to be adequate in quantity for the next 45 years.

3. Village of Alexandria Bay

The Village derives its water supply from the St. Lawrence River. The water receives only chlorination before use. The Village is subject to seasonal variations in population and, consequently, in demand. Golf course watering also creates fluctuations in demand.

Improvements in the distribution system and in pumping and storage facilities were made in the 1960's. It may be necessary to filter the water in the future.

4. Village of Cape Vincent

Cape Vincent takes its water supply from the St. Lawrence River. The water receives only chlorination before use now, but filtration may be necessary in the future.

The village applied to DEC in 1974 for permission to refurbish the pumping, chlorination and storage facilities. The new pumping facilities will allow the system to take an additional 120,000 gallons per day from the river.

5. Village of Chaumont

The village takes its water supply from Lake Ontario. The water is filtered before use and maximum capacity of the filtration plant is 385,000 gallons per day. Source supply, pumping capacity and filtration facilities are expected to be adequate through 2020.

6. Village of Clayton

The St. Lawrence River is the source of supply for the Village of system. The water is not filtered. Bacterial count varies widely and filtration may be necessary in the future. Source supply and pumping capacity are adequate for the planning period.

7. Thousand Island Park

The Park located on Wellesley Island, is supplied by a privately owned water system between April 15 and October 10. During the remaining part of the year, the residents use individual well supplies. Water supply for the system is taken from the St. Lawrence River. The water is not filtered before use. The pumping facilities, while old, are considered adequate.

During the summer months the lakeshores in the owns of Henderson, Hounsfield and Ellisburg are heavily populated. Many of the seasonal residents use water from the lake for all purposes except drinking. Drinking water is often transported in or taken from individual well supplies.

No new water supply systems are expected to be constructed in the foreseeable future along the coastline of Jefferson County. Present and projected population densities are too low to make a project economically feasible.

Table II-7 summarizes the present and projected water supply demands and alternatives to meet needs of the above discussed systems.

B. Boundary Line Determination

There are no special boundary line considerations necessary for water supply in Jefferson County. It appears that the pump stations for the six communities that use either Lake Ontario or the St. Lawrence River as source are located near the water's edge and would fall within even a minimum management area.

C. Areas for Protection

There are no significant groundwater aquifers near the coastline in Jefferson County. The pumping and treatment facilities of Alexandria Bay, Clayton, Cape Vincent, Clairmont, Thousand Island Park and Sackets Harbor which are located on the coastline should be protected. If watershed rules have been established for the intake areas of these systems, they should be taken into account when determining the management plan.

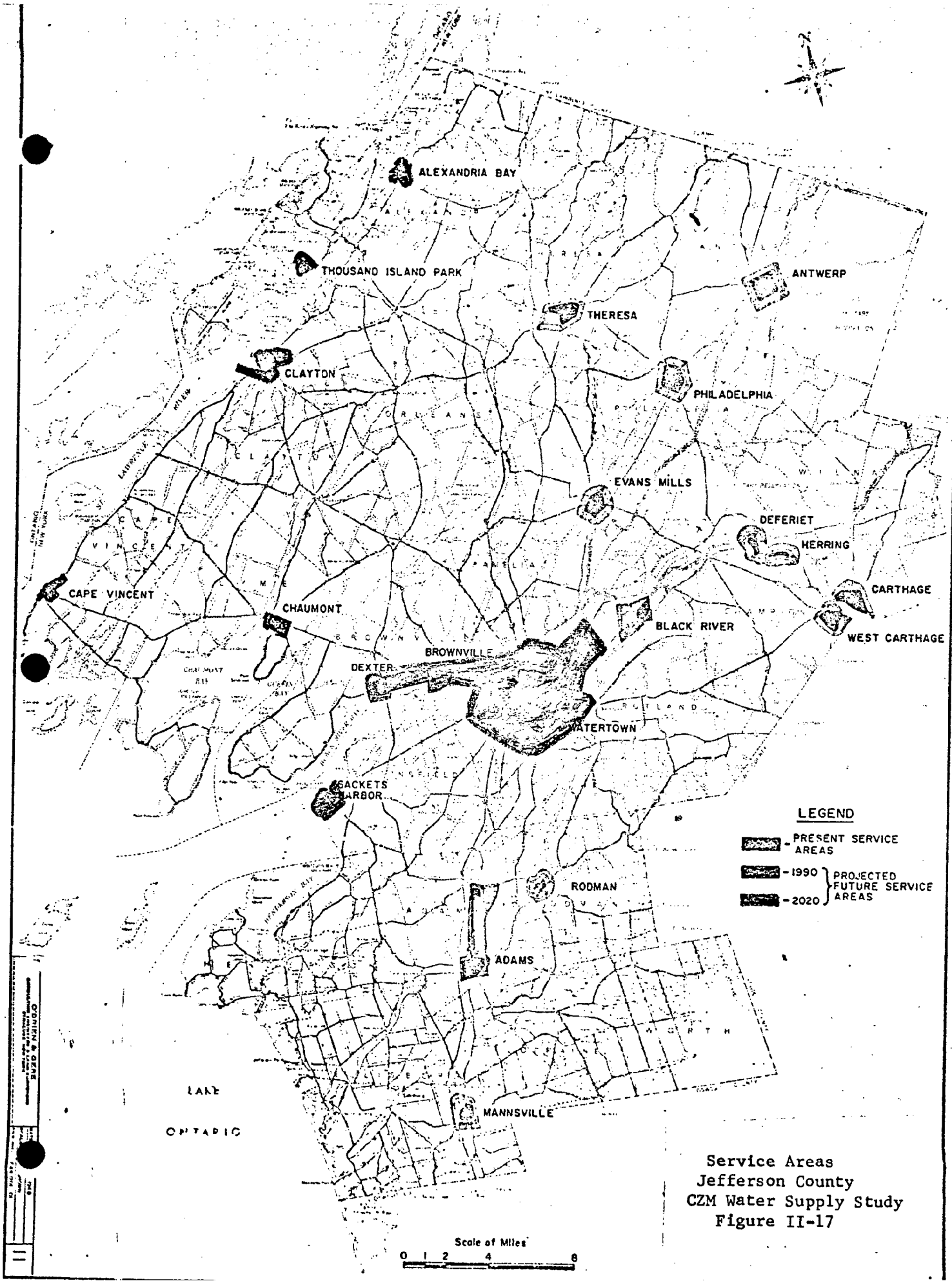
The City of Watertown should be contacted to determine their plans for the future. If they intend to go to Lake Ontario for their supply, the coastal zone management plan will have to recognize this.

TABLE II-7

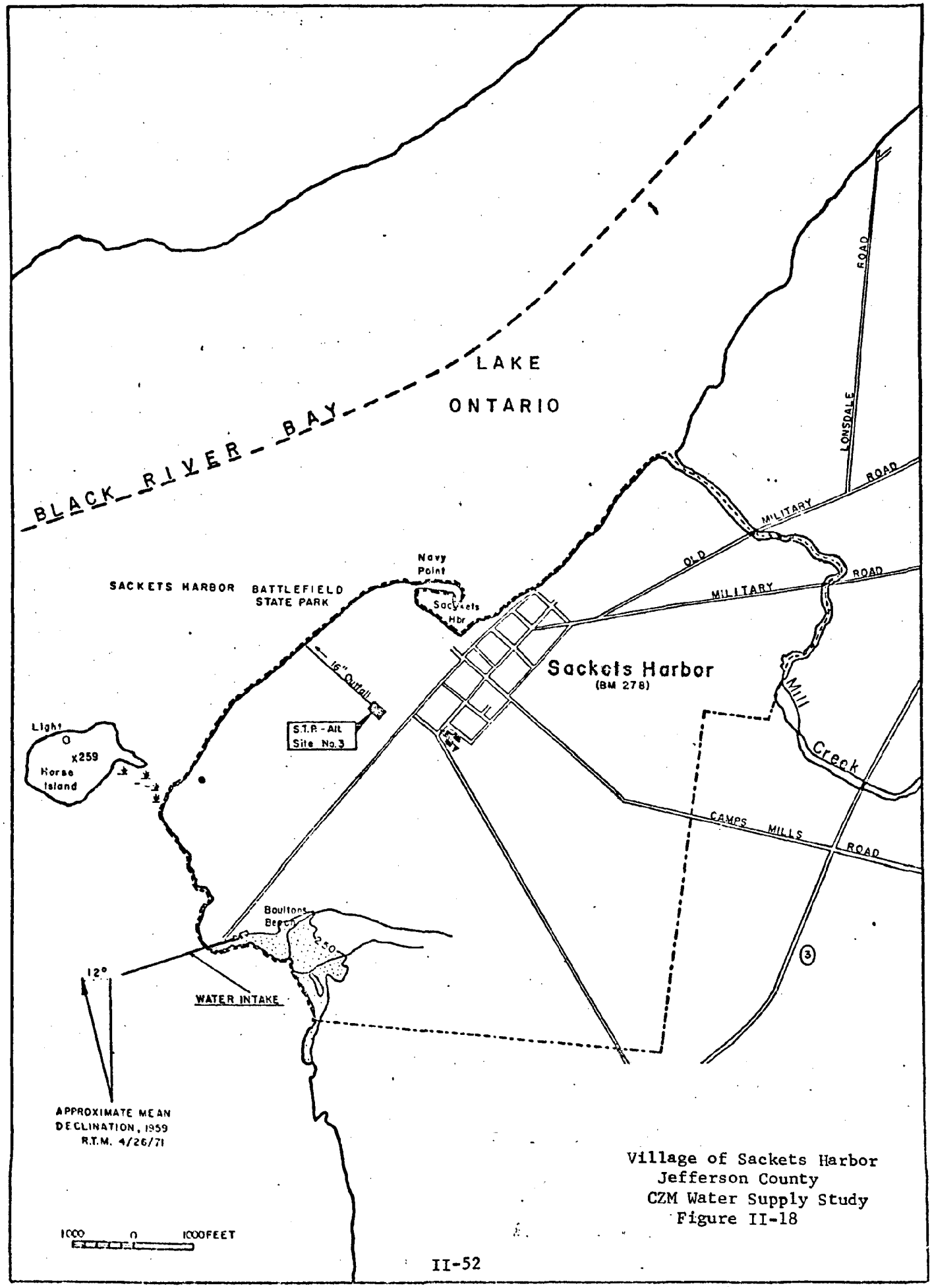
Existing Public Water Supply Systems

Jefferson County

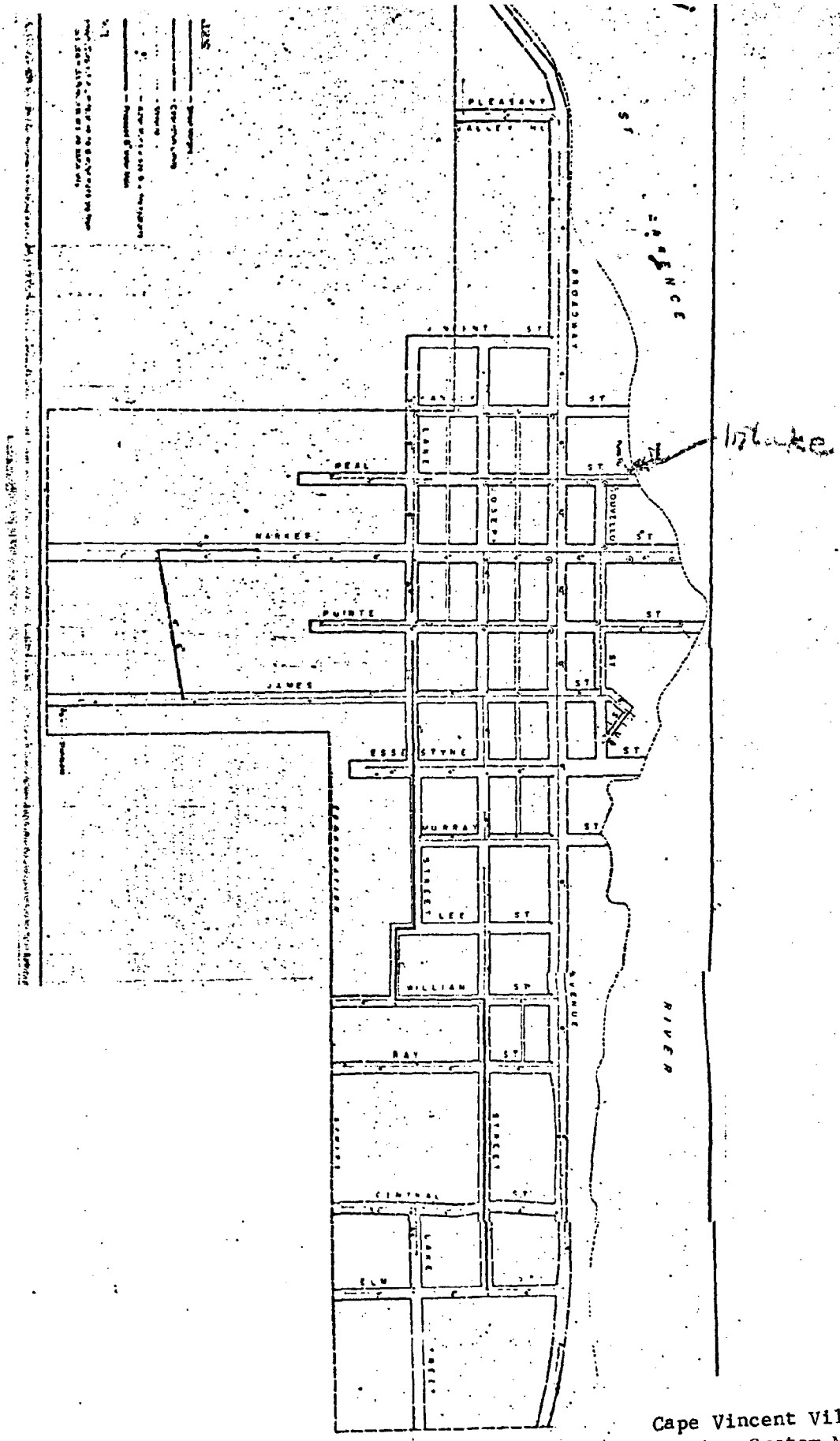
Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Average Daily Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Watertown	Black River	9.0	4.8	6.02	7.13	Join a county water District. Around 1990, add to treatment plant.
Brownville	Well	0.29	0.11	0.25	0.31	
Dexter	Well	0.14	0.11	0.11	0.13	
Sackets Harbor	Lake Ontario	0.58	0.14	0.17	0.20	
Glen Park	Village of Brownville	-	-	-	-	Same as Brownville
Alexandria Bay	St. Lawrence River	N.A.	0.4 (w) 0.6 (s)	0.48	0.62	
Cape Vincent	St. Lawrence River	N.A.	0.180 (w) 0.270 (s)	0.22	0.27	
Chaumont	Lake Ontario	0.385	0.05	0.07	0.09	
Clayton	St. Lawrence River	N.A.	0.47 (w) 0.60 (s)	0.54	0.58	
Thousand Is. Park	St. Lawrence River	N.A.	0.20	0.31	0.47	



Service Areas
Jefferson County
CZM Water Supply Study
Figure II-17



Village of Sackets Harbor
Jefferson County
CZM Water Supply Study
Figure II-18



Cape Vincent Village
Water System Map
CZM Water Supply Study
Figure II-19

ST. LAWRENCE COUNTY

There are five water supply systems operating in the coastal area of St. Lawrence County. Four of the five take their water supply from the St. Lawrence River. The amount of water withdrawn by these systems is miniscule compared to the St. Lawrence River flow of 164 billion gallons which flow by Massena daily. Following is a brief description of the water systems of St. Lawrence County located in the coastal area.

A. Description of Public Water Supply Systems

1. Village of Morristown

The village obtains its water supply from the St. Lawrence River. The water is filtered and chlorinated before use. The pumping and treatment facilities are nine years old and are considered adequate through 2020. Figure II-26 shows the location of the facilities and the extent of the distribution system.

2. City of Ogdensburg

The City takes its water from the St. Lawrence River. The present water supply and treatment facilities date back to 1910. The distribution system is old and leaks excessively. The storage system is inadequate.

The St. Lawrence County Comprehensive Water Supply Study recommends that the pumping facilities should be replaced by a new pump station located 2,000 feet upstream of the existing station. Pumping capacity should be increased to at least 7.25 mgd. The existing slow sand filter treatment plant should be replaced by a diatomaceous earth filtration plant on the same site. Two new storage facilities are also recommended. Figure II-24 shows the recommended location of all

of these facilities. The location of the existing facilities and the extent of the distribution system are also shown on Figure II-23.

Ogdensburg has a deep water port with access to the St. Lawrence Seaway. As such, its growth potential is considerable. So far, it has been unable to attract any major industry. It is likely that any large water user locating in the area would obtain its supply directly from the St. Lawrence River.

3. Village of Waddington

Water for the Village system is obtained from two 17 year old drilled wells located within its boundaries. Treatment is provided for hydrogen sulfide removal. The supply and treatment facilities are expected to be adequate through 2020. Figure II-25 shows the location of the wells and the areal extent of the distribution system.

4. Tucker Terrace Water Company

This is a small privately owned system located about four miles northwest of Massena. The system serves a residential subdivision of which had a population of about 90 in 1968.

Water is taken from the St. Lawrence River and is filtered through pressure type diatomaceous earth filters before use. Figure II-22 shows the location of system facilities.

The only system deficiency noted in the St. Lawrence County Comprehensive Public Water Supply Study is the 300 gallon pressure tank. The study recommends its replacement with a 1500 gallon capacity tank.

5. Village of Massena

The Village distribution system is located away from the coastal area, being about three miles south of the St. Lawrence River. However, the Village's pumping station is located on the shoreline of the River, at the mouth of the Massena Power Canal. The treatment plant is located

on the south bank of the Power Canal, about one mile from the St. Lawrence River shoreline. Figure II-23 shows the location of these facilities.

The St. Lawrence County Comprehensive Water Supply Study indicates that the pumping facilities are adequate through 2020. It recommends that, to compensate for a shortage of storage capacity, an additional high lift pump be installed at the treatment plant. The treatment facilities are adequate through 2020.

No communities within a mile of the St. Lawrence River shoreline are expected to be able to construct a new public water supply system at a reasonable cost in the near future.

Table II-9 lists pertinent information on the above-described systems.

B. Boundary Line Determination

No special boundary line considerations are required for water supply. The pumping stations of Morristown, Ogdensburg. Tucker Terrace and Massena and Waddington's well field are all located within 500 feet of the St. Lawrence River shoreline. The diversity of use of the shoreline from industrial to residential to recreational makes it difficult to suggest a uniform width for the management area. A detailed examination of land use is needed to establish the boundary line.

C. Areas for Protection

Areas requiring protection are around the intakes of Mawsena, Ogdensburg, Morristown and Tucker Terrace and Waddington's well field. None of these systems have had watershed rules enacted. The St. Lawrence County Comprehensive Water Supply Study has suggested that the City of Ogdensburg move its intake to a new location (See Figure II-24). The City officials should be queried as to whether there are any plans to do so. Locations of the intakes for the industrial supplies listed in Table 8 are needed.

TABLE II-8

MAJOR WATER USING INDUSTRIES OF ST. LAWRENCE COUNTY
LOCATED NEAR THE ST. LAWRENCE RIVER

LOCATION, SOURCE OF WATER SUPPLY AND WATER DEMAND

NAME OF INDUSTRY AND LOCATION	SOURCE OF WATER SUPPLY	WATER DEMANDS IN GALLONS PER DAY AVERAGE	MAXIMUM
ACCO Ogdensburg	St. Lawrence River Well	1,000 6,000	1,000 7,500
ALCOA Massena	St. Lawrence River	20,500,000	27,000,000
CHEVROLET -G.M.C.	St. Lawrence River	2,500,000	4,000,000
DIAMOND NATIONAL Ogdensburg	St. Lawrence River	3,000,000	4,200,000
REYNOLDS METALS Massena	St. Lawrence River	8,000,000	10,000,000
	TOTALS	34,007,000	45,208,500

Source: St. Lawrence County Comprehensive Water Supply Study

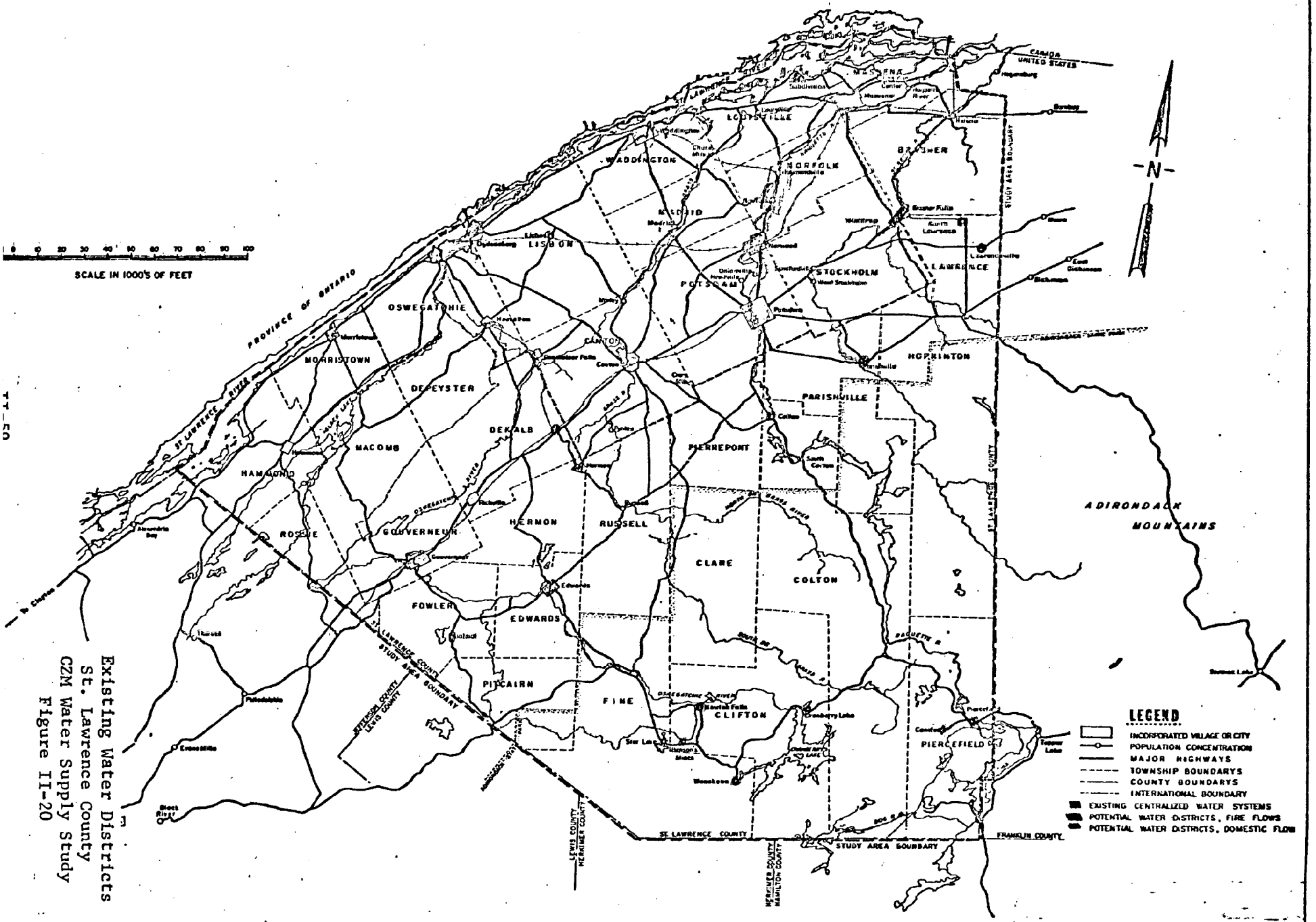
TABLE II-9

EXISTING PUBLIC WATER SUPPLY SYSTEMS

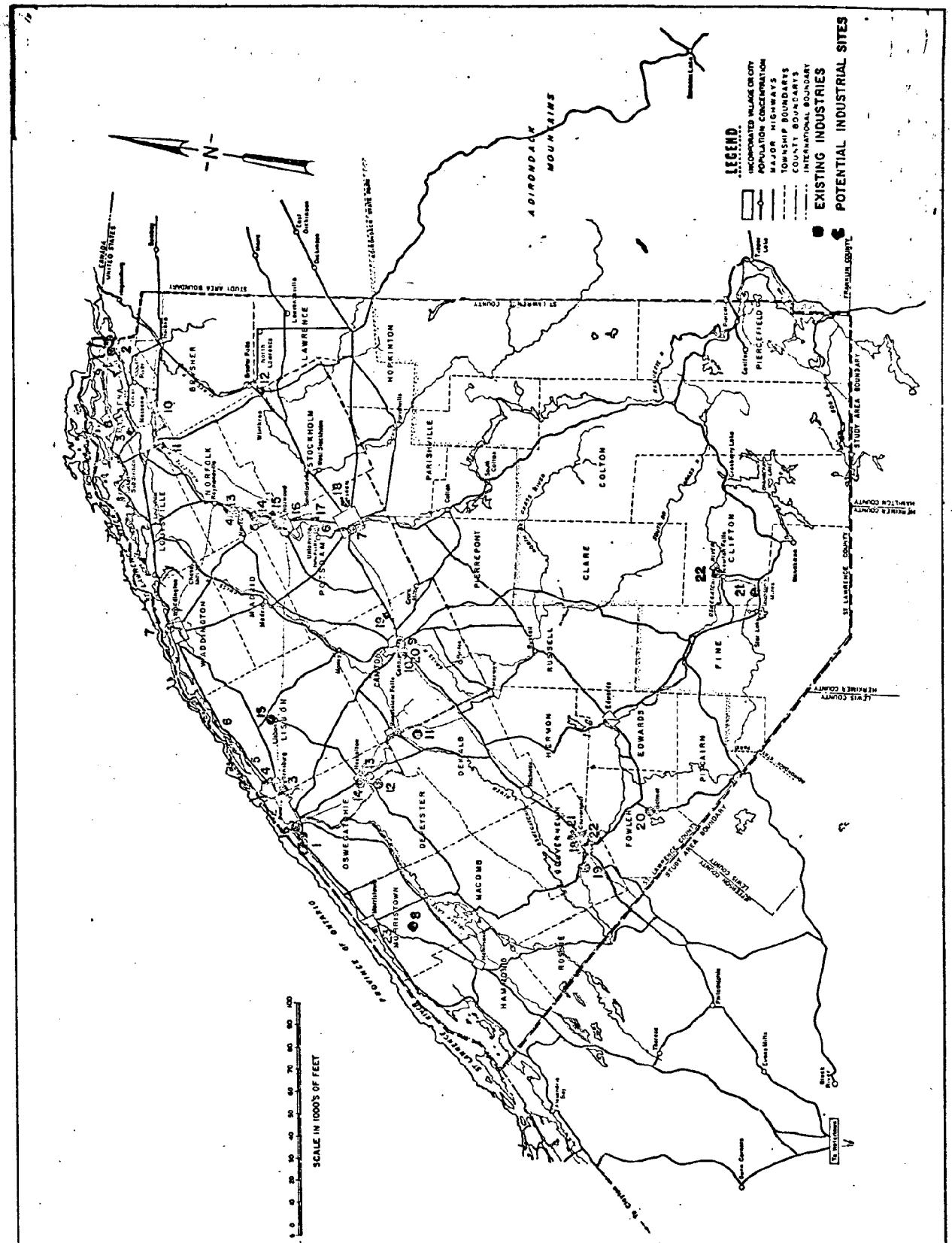
St. Lawrence County

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Morristown	St. Lawrence R.	0.360	0.066	0.091	0.142	
Ogdensburg	St. Lawrence R.	5.25	3.16	3.85	5.14	Modernize system, increase pumping capacity to 7.25 mgd
Waddington	Wells	0.340	0.10	0.16	0.27	
Tucker Terrace	St. Lawrence R.	0.086	0.008	0.014	0.022	
Massena	St. Lawrence R.	5.0	2.07	3.12	5.57	Install additional high lift pump at treatment plant, increasing capacity to 7.5 mgd.

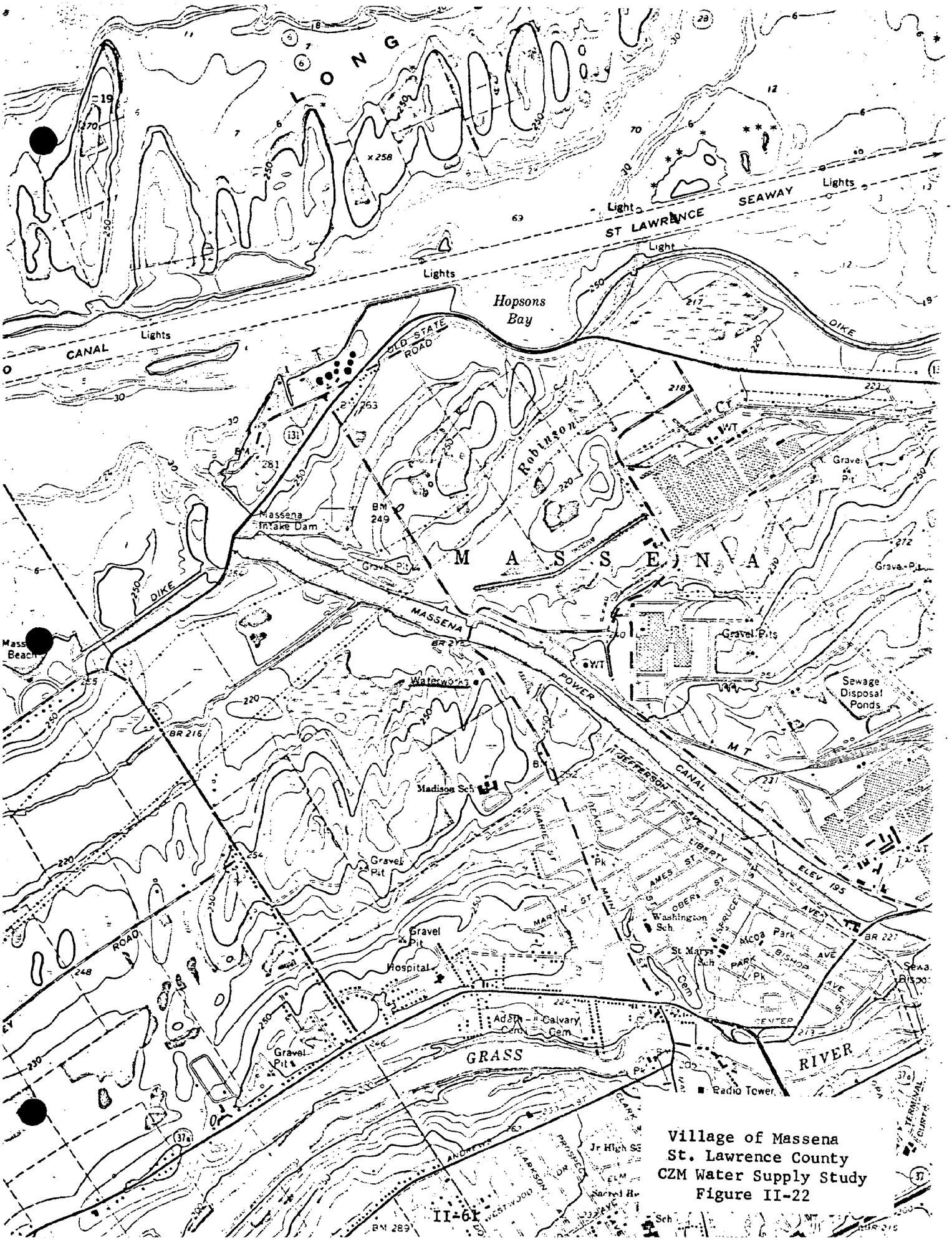
1/ Projected demand for the year 2000



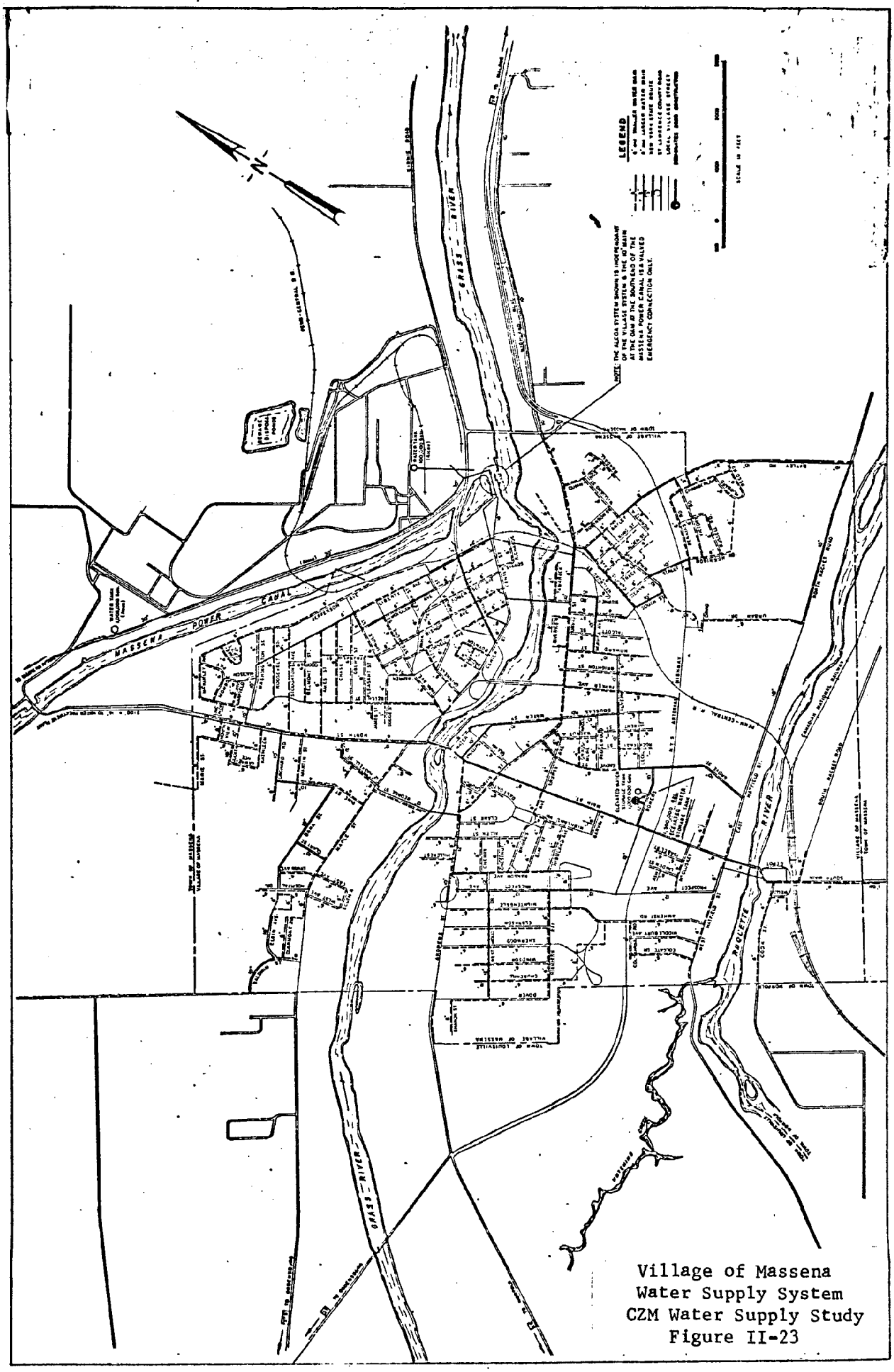
Existing Water Districts
St. Lawrence County
CZM Water Supply Study
Figure II-20



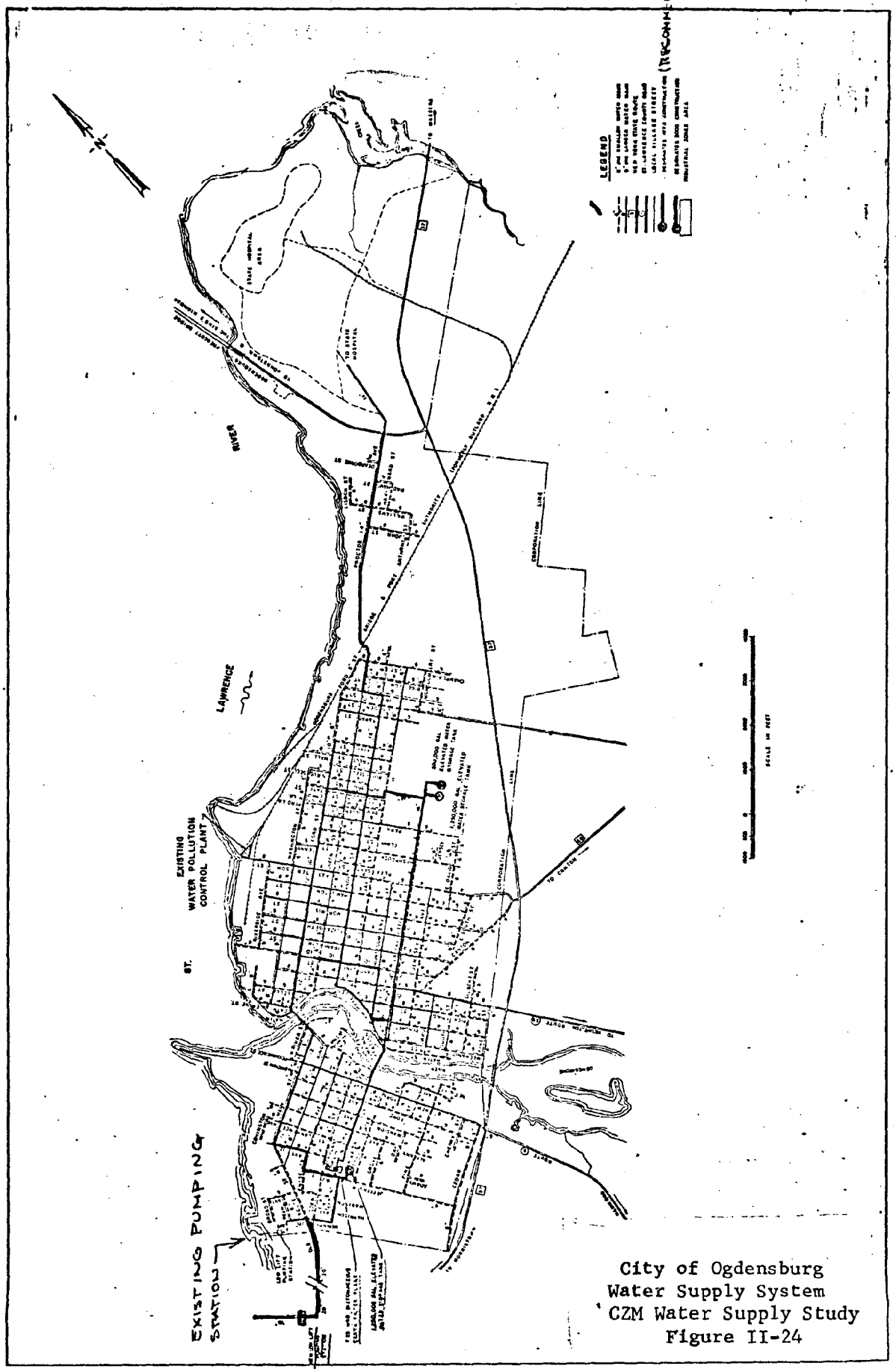
Major Water Using Industrial Sites
St. Lawrence County
CZM Water Supply Study
Figure II-21



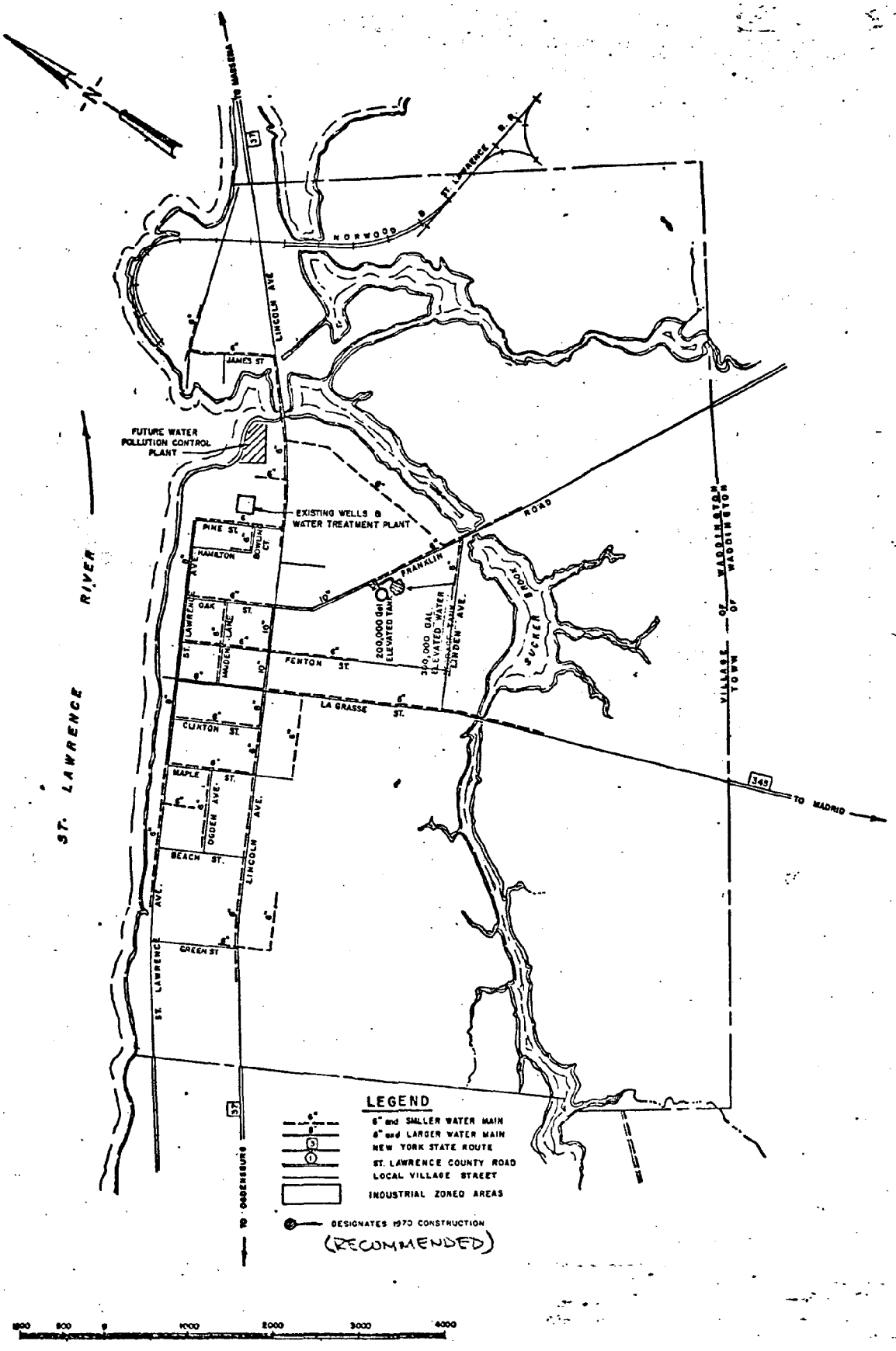
Village of Massena
St. Lawrence County
CZM Water Supply Study
Figure II-22



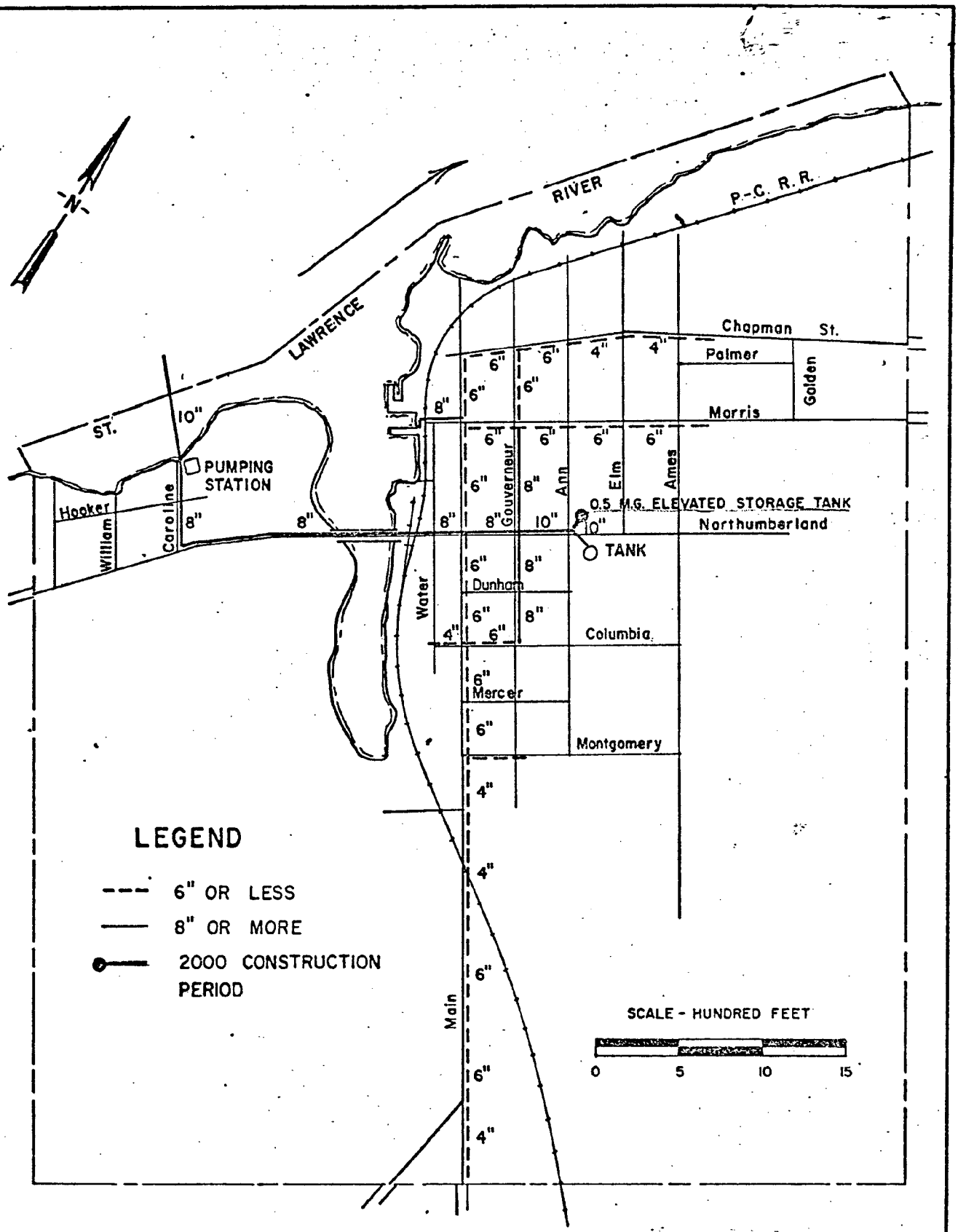
Village of Massena
Water Supply System
CZM Water Supply Study
Figure II-23



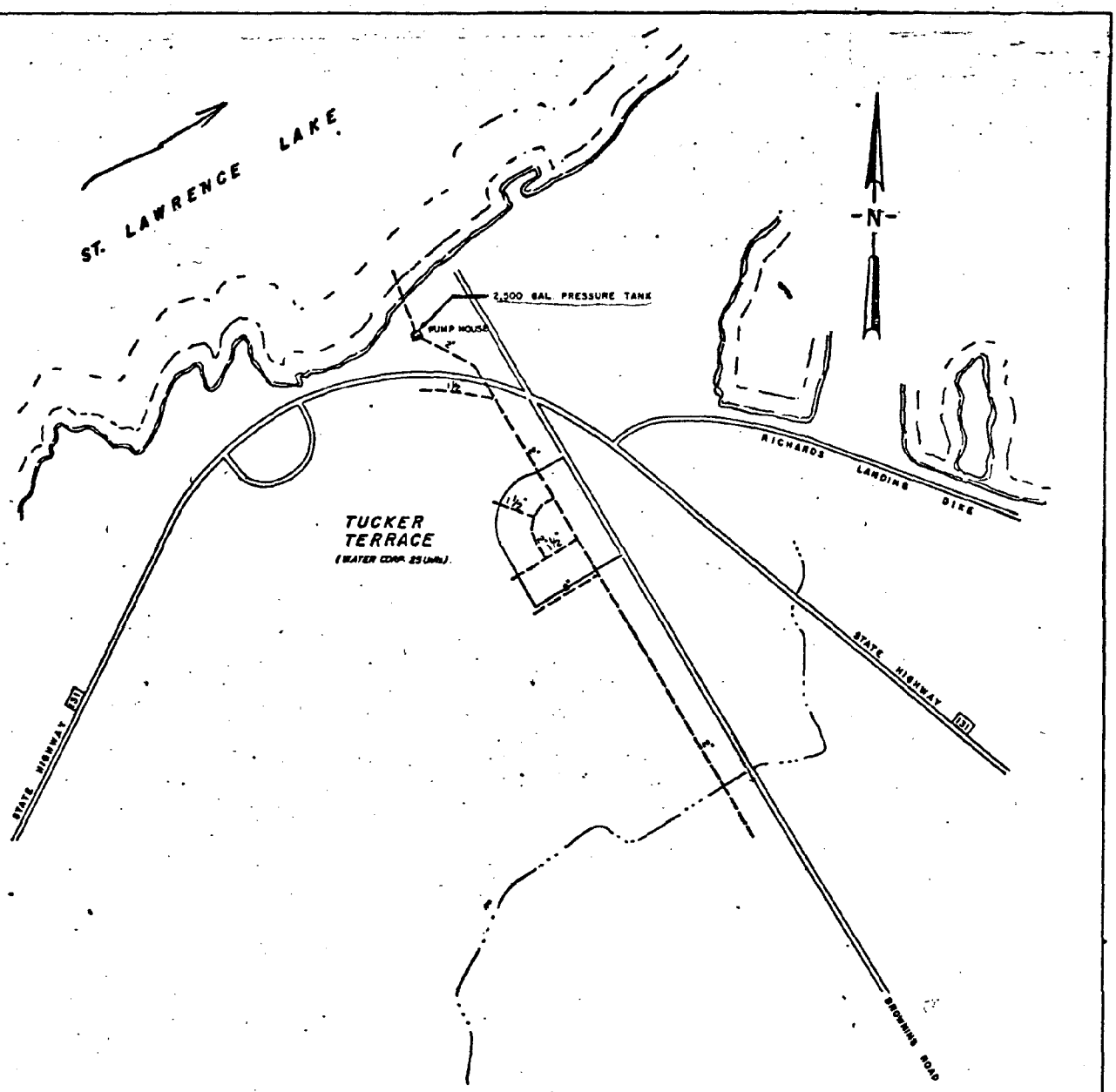
City of Ogdensburg
Water Supply System
CZM Water Supply Study
Figure II-24



Village of Waddington
Water Supply System
CZM Water Supply Study
Figure II-25



Village of Morristown
Water Supply System
CZM Water Supply Study
Figure II-26



Tucker Subdivision
Water Supply System
CZM Water Supply Study
Figure II-27

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SECTION III

HUDSON RIVER SUBAREA

GENERAL

The Hudson River Subarea is the ten counties adjacent to the tidal waters of the Hudson River upstream from New York City. The tidal water of the Hudson River extend approximately 130 miles upstream from New York City to the Federal Dam located between the Village of Green Island, Albany County and the City of Troy, Rensselaer County. The ten counties are: Albany, Rensselaer, Greene, Columbia, Ulster, Dutchess, Orange, Putnam, Rockland and Westchester.

The economy of the area is based primarily on the State Capitol at the upstream end, light industries as well as tourism in the middle and New York City suburbia at the downstream end.

Geologically the area was greatly effected by the glacial activity from the Ice Age which left pockets of surficial deposits of sand and gravel. Some of these deposits provide sources of groundwater in sufficient quantity and quality for a municipal water supply system.

The area contains 321 municipal water districts of which 97 may be effected by coastal zone management measures. For the most part, water sources are located far enough from the shoreline to warrent little if any consideration. However, there are 11 known industrial intakes, 2 infiltration galleries, 2 existing municipal intakes, 2 potential municipal intakes and 8 groundwater aquifers within the potential coastal zone area that warrent further study.

An analysis of the water supply districts for each of the ten counties follows.

Albany County

Albany County contains the western half of the Federal Dam, which is the upstream terminus of the tidal waters of the Hudson River. Employment comes from various industries and the activities related to a state capital. The chief industries are printing and publishing, textiles, machinery and metal products, plus stone products.

About three quarters of the county drains towards the Hudson River. The Normanskill and the Snake Hill Formations are located along the Hudson River. These shale formations yield very little groundwater and are not commonly considered aquifers. The major streams are Normanskill, Vloman Kill, Coeymans Creek and Hannacrois Creek.

Municipal Water Systems

Albany County has fifteen water districts. Of these, six are supplied totally or partially by groundwater. Eleven Districts use surface water as a source. Three Districts purchase part or all of their water. The seven Districts located within the coastal plain area are shown on Table III-1 and are described below.

1. City of Cohoes

The City of Cohoes is technically upstream from the coastal zone area, but it does sell water to the Village of Green Island, which is in the coastal zone area. Water is taken from the Mohawk River through the power canal of the Niagara-Mohawk Power Corporation. The treatment facilities are adequate to meet the City's projected demands to 2020. However, changes in the pumping and transmission facilities are needed to meet projected future demands to 2020 for both the City and the Village.

2. Village of Green Island

An infiltration gallery on Center Island in the Hudson River was the original source of water for the village. During the severely cold winter of 1962-63, the gallery yielded only 0.75 mgd, which was half of its rated capacity. In 1963, the village entered into a 40-year contract with the City of Cohoes to provide them with water through a 16-inch main. Both sources are currently being used. In CPWS-43, a recommendation to phase out the gallery was made. Alternatives for purchase of water from the City of Cohoes or the City of Watervliet as well as the interconnection of all three communities were considered viable.

3. City of Watervliet

In 1916, the City developed a public water supply on Norman's Kill approximately 13 miles west of the City in the Town of Guilderland known as Watervliet Reservoir. The reservoir has excess capacity to meet projected needs to 2020. However, improvements in the transmission mains and an expansion of the water treatment plant will be required. In addition to the interconnections with Cohoes and Green Island described above, expansion of the system for the Town of Guilderland was considered.

4. Village of Menands

In 1955 the village entered into a 40-year contract with the City of Troy for the purchase of a minimum of 1.5 mgd to a maximum of 4.5 mgd. Water is pumped under the Hudson River through a 20-inch main. No problems are expected to meet projected future needs to 2020.

5. City of Albany

The City in 1932 abandoned the Hudson River as a source of supply and constructed the Alcove and Basic Reservoirs on Hannacrois and Basic Creeks respectively. The reservoirs are located approximately 13 to 15 miles southwesterly from Albany. A decision by the former Water Resources

Commission requires that the City must release water to supply the needs of the Village of Ravena located downstream from the Alcove Reservoir. The existing sources would be adequate to meet projected demands for the City, but cannot satisfy projected demands for Revena too. The City will need to make alterations to its system by 2020 either to satisfy projected increases in demands for Ravena or to meet the City's peak demands with the treatment plant. CPWS-43 recommends a new source of supply from either Catskill Creek about 7 miles south of the county line in the Town of Cairo, or Normans Kill below the Watervliet Reservoir.

6. Town of Bethlehem

Bethlehem Water District No. 1 supplies water to approximately 81 percent of the population of the Town of Bethlehem. The present sources of supply are two dug wells a reservoir on Vly Creek and a diversion dam on the West Fork of Onesquethaw Creek; all are located in the Town of New Sctoland. In CPWS-43, the demands of the Town of New Scotland were combined with the Town of Bethlehem since no other sources were available within the Town. As a result, the system will not meet projected demands by 1988. The three alternative sources for a combined system are a diversion dam on Normans Kill, a reservoir on Vloman Kill or a reservoir on Onesquethaw Creek.

7. Village of Ravena

The village draws water from Hannacrois Creek at Deans Mills, in the Town of Coeymans, Greene County. Through a decision by the Water Resources, the City of Albany must release sufficient water from its Alcove-Basic Reservoir System to meet the villages demands.

Self-Supplied Industrial Water Systems

The reconnaissance study recorded fifteen major industrial water users for Albany County in 1965. Of these, fourteen were supplied partially water from public water supply systems. Five systems take water from the Hudson River through their own systems. The major industrial water users are listed in Table III-2.

Boundary Line Determination

From a water supply standpoint, the location of a boundary line for coastal zone management appears unimportant. All municipalities obtain all or part of their water outside the zone. An educated guess concerning the self supplied industrial use would be that water quality is not a concern in their water use.

Areas of Protection

Groundwater use is miles away from the Hudson River and does not affect a coastal zone management plan. The type of industries presently using the Hudson River do not appear to require special protection for their intakes (an interview with these industries is needed). Only the infiltration gallery on Center Island for the Village of Green Island appears as a possibility. If this is phased out of use as recommended by the consultant, no protection would be required.

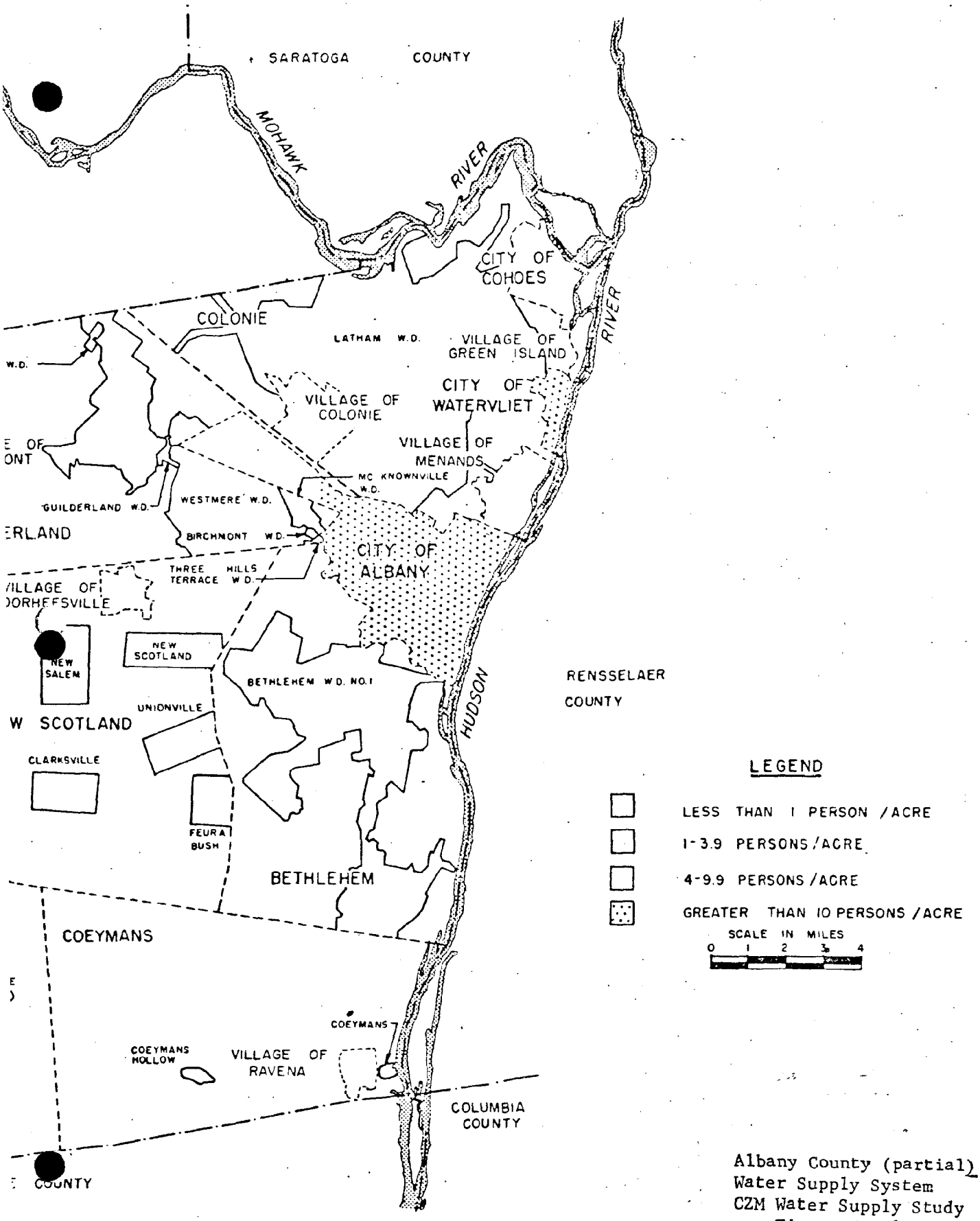
TABLE III-1
Existing Public Water Supply Systems
Coastal Zone Area
Albany County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)	Projected Demand (MGD): 1970	Projected Demand (MGD): 1990	Projected Demand (MGD): 2020	Alternatives to Meet Future Needs
Cohoes (C)	Mohawk R.	15.0	5.6	5.7	9.0	1. None w/o Green Island (V) 2. Change mains
Green Island (V)	Hudson R. Cohoes (C)	0.75 (16" main)	1.1	1.5	4.0	Purchase from Cohoes and/or Watervliet
Watervliet (C)	Watervliet Reservoir	9.4	3.9	4.6	5.0	None w/ main changes
Menands (V)	Troy (C)	(20" main)	1.8	2.5	3.5	None
Albany (C)	Alcove Res. Basic Res. Silver Cr. Res.	32.0 (filter)	22.0	26.6	32.8	1. None with changes in plant and mains 2. Catskill Cr. 3. Normans Kill
Bethlehem (T)	Vly Cr. Res. 2 wells	3.1 0.4	1.4	2.6	7.5	1. Normans Kill 2. Vloman Kill 3. Onesquethaw Creek
Ravena (V)	Hannacrois Cr. Res.	1.0 (filter)	0.4	0.5	0.6	None w/ releases from Alcove-Basic Res.

TABLE III-2
Self-Supplied Industrial Water Systems
Coastal Zone Area
Albany County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)*	Projected Demand (MGD)**: 1970	1990	2020	Alternative to Meet Future Needs
Allegheny Ludlum Steel Corp.	Hudson R. & Reservoir	4.30	6	9	15	
Ford Motor Corp.	Hudson R.	0.79	1	2	3	
John A. Manning Paper Co.	Hudson R.	7.15	9	15	24	
Atlantic Cement Co.	Hudson R.	1.20	2	3	4	
Niagara-Mohawk Steam Gen. Plant	Hudson R.	520.00	660	1100	1750	
ALBANY COUNTY TOTAL**		533.44	679	1132	1794	

* 1965 withdrawal
** County Total Estimated in TAMS Recon. Report Proportioned to Nearest MGD



Albany County (partial)
Water Supply System
CZM Water Supply Study
Figure III-1

Rensselaer County

Rensselaer County contains the eastern half of the Federal Dam, which is the upstream terminus of the tidal waters of the Hudson River. The economy of the western and central sections of the county is closely linked to the Capital District. About one-third of the labor force in that area is employed in Albany County. Employment elsewhere comes from firms engaged in manufacturing, wholesale trade, retail trade and service industries.

The northern and eastern portions of the county lie within the Hoosic River watershed, which drains into the Hudson River upstream of Troy. The remainder of the county is drained in a westerly direction towards the Hudson River by the Poestenkill, Wynantskill, Moordenerkill, Kinderhook Creek and numerous smaller streams.

No major aquifers lie within the area generally considered the coastal zone. The geology adjacent to the Hudson River contains shale from the Normanskill shale and the Snake Hill Formation.

Municipal Water Systems

Rensselaer County is unique in that a large portion of the county is supplied from one source, Tomhannock Reservoir. Twenty water districts including the Village of Menands in Albany County takes water from sources in Rensselaer County. Twelve districts use groundwater entirely. One district uses both surface and groundwater. Schaghticoke Water District No. 2 purchases its water from the Village of Mechanicville in Albany County. The two water systems for the coastal zone area are listed in Table III-3 and described briefly below.

City of Troy

The Tomhannock Reservoir was built by the City of Troy, who sells water to most of the coastal zone area in Rensselaer County. Through six separate

contracts, the City sells water to water distrcits in the Towns of Brunswick, East Greenbush, North Greenbush, and Schaighticoke as well as the villages of Rensselaer and Menands (Albany County). In CPWS-76, new treatment and transmission facilities are recommended to meet projected demands for 2000. The safe yield of the reservoir was revalued after the mid 1960's drought from 45.8 MGD to 35.5 MGD. Projected demands for 2020 for the entire system are slightly more than the latter estimate. An alternative source of supply to the southern portion of the service area (around the village of Rensselaer) is a reservoir on Tsatsawassa Creek.

Village of Castleton

The Village of Castleton takes water from Vlockie Kill and sells a portion of it to the Maple Hill Park Public Water System. The safe yield of the source is about 0.5 MGD. CPWS-76 foresaw a possible water quality problem with the development of the watershed upstream from the diversion dam. With this development toward the east, expansion was toward a aquifer near the middle of the county, which was recommended for development as a replacement.

Self Supplied Industrial Water Systems

TAMS Reconnaissance Study listed eleven major industrial water users within the county. Six industries purchase water from public water supply systems. Two of the five industries listed as self supplied take water from the Hudson River. CPWS-76 lists Winthrop Laboratories as having a self supplied system (not listed in TAMS). Table III-4 lists the self supplied industries.

Boundary Line Determination

From a water supply standpoint, the determination of the boundary line appears unimportant. The high yielding aquifers are located miles

from the Hudson River. No municipal water supply systems take water from the Hudson River. Two or three industrial systems might be using the Hudson River.

Areas of Protection

A similar discussion as in the above paragraph leads to nothing.

TABLE III-3

Existing Public Water Supply Systems
Coastal Zone Area

Rensselaer County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity MGD	Projected Demand (MGD): 1970	Projected Demand (MGD): 1990	Projected Demand (MGD): 2020	Alternatives to Meet Future Needs
Troy (C)*	Tomhannock Reservoir	35.5 (source)	23.5	29.5	37.2	Tsatsawassa Creek
Castleton (V)**	Vlockie Kill	0.5	0.4	1.5	2.6	wells

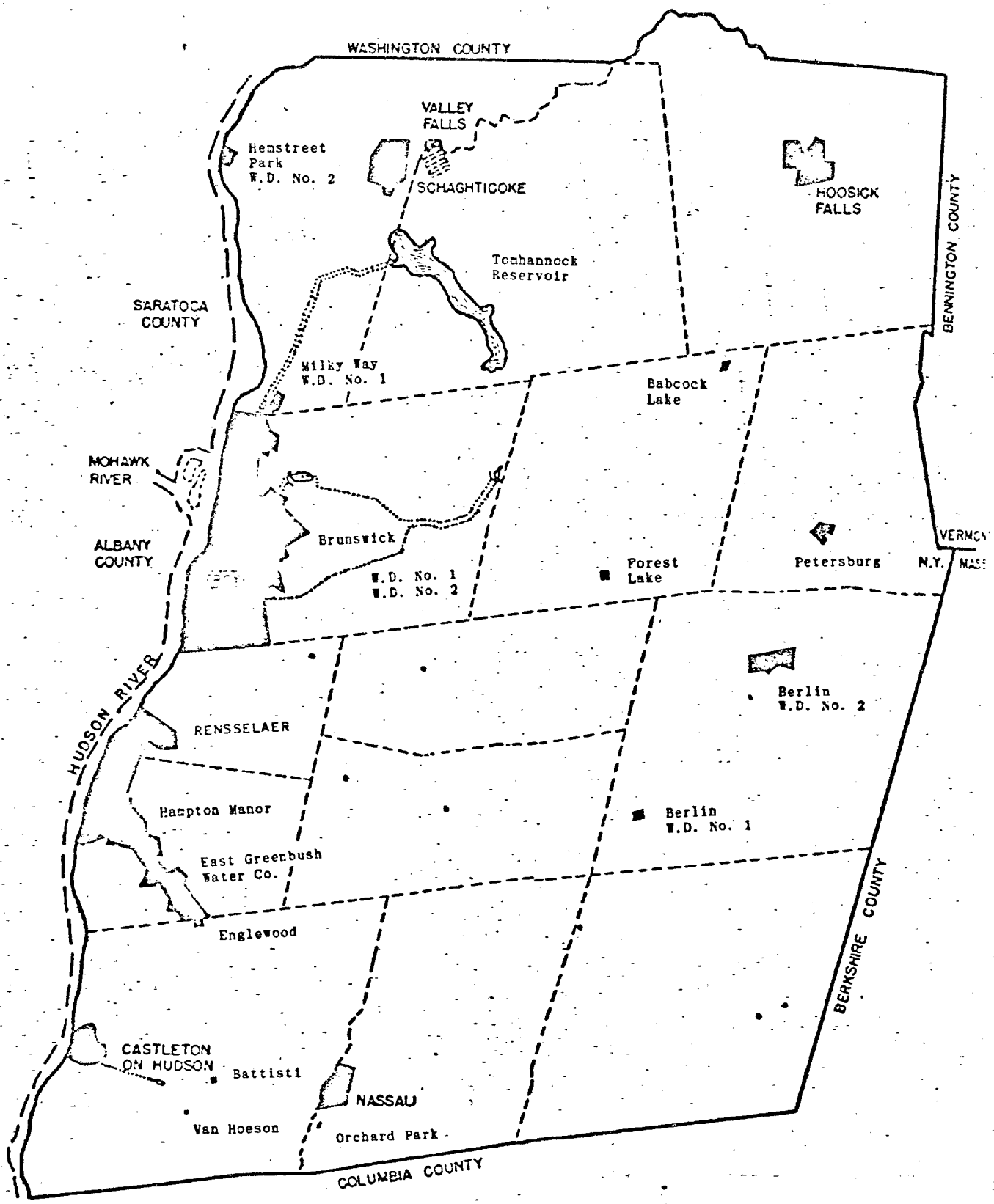
* Sells water to water districts in seven communities

** Sells water to Maple Hill Park P.W.S.

TABLE III-4
Self-Supplied Industrial Water Systems
Coastal Zone Area
Rensselaer County

	Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)*	Projected Demand (MGD)**: 1970	1990	2020	Alternatives to Meet Future Needs
***	General Aniline & Film Corp.	Hudson R.	4.30	5.6	11.0	30.7	
	Republic Steel Corp.	Hudson R.	5.70	7.4	14.6	40.7	
	RENSSELAER COUNTY TOTAL**		9.60	12.5	24.6	68.6	
	Winthrop Laboratories						

* 1965 withdrawal
** County Total in TAMS Recon. Report Proportioned to Nearest 0.1 MGD
*** Firm is shown on map, but was not listed in table (TAMS error?) proportioned by County total



Rensselaer County
Water Supply System
CZM Water Supply Study
Figure III-2

Greene County

Greene County is located along the westerly shore of the Hudson River immediately downstream (south) of Albany County. Employment in the county comes from manufacturing and activities associated with seasonal recreation in the summer. The major manufacturers are apparel as well as stone, clay and glass products.

The western half of the county drains northwesterly through the Schoharie Creek watershed. The eastern half drains easterly towards the Hudson River through the watersheds of Catskill Creek, Coxsackie Creek, Murderers Creek and other small tributaries. The Normanskill and Deepkill shales formation underlies the eastern boundary of the county in a belt from one to three miles thick.

Municipal Water Supply Systems

Of the eleven municipal water supply systems in the county, four are located in the coastal zone. Three of these use surface supplies from outside the coastal zone as a source. One system uses groundwater. The four systems are listed in Table III-5 and described below. CPWS-25 analyzed seven alternative systems recommending the Hudson River as a source. Unlike other studies, only regionalized systems were considered.

Village of Athens

The village uses Hallister Lake as a source of supply. Since the lake is only 3.1 feet deep, water quality problems occur especially in the summer. The estimated safe yield of the source is 0.35 MGD. The transmission system from the lake to the village is inadequate.

Village of Catskill

The village takes water from its reservoir on Potic Creek, which is capable of yielding 1.22 MGD. Although the reservoir site could hydrologically yield more water, the reservoir cannot be enlarged economically. The treatment and transmission facilities need modifications.

Hamlet of Cementon

Technically, a public water supply system exists in the hamlet since a well from the cement plant supplies the plant a school and a few houses.

Village of Coxsackie

The Village takes its water from Murderers Kill. At the time of the study (1967), Medway Reservoir was being constructed as an expansion of the source. The estimated yield of the source is 1.22 MGD. Future plans for the village calls for the construction of Beaver Dam Lake in the adjoin watershed.

Regionalized System (Alternative Sources)

CPWS-25 studied the possibilities of intermunicipal systems only. The "Master Plan" proposed two general systems of which the valley system affects the coastal zone area. The seven alternative systems considered three intake sites along the Hudson River and four reservoir sites. The reservoir sites were (1) Catskill Creek near Oak Hill, (2) Catskill Creek near Woodstock, (3) Potic Creek near its confluence with Catskill Creek, and (4) Ten Mile Creek near its confluence with Catskill Creek. The recommended plan called for an intake on the Hudson River between Athens and Catskill.

Self Supplied Industrial Water Systems

Except for the cement plant in Cementon, no self supplied water supply systems are known.

Boundary Line Determination

No major aquifers underlie the coastal zone area. Existing major water supplies transport water from outside the coastal zone. From a water supply viewpoint, boundary line is unimportant.

Areas of Protection

The cement plant at Cementon uses well water from a low yielding aquifer area. In addition, CPWS-25 recommends taking water from the Hudson River. A zone of protection around both areas might be needed.

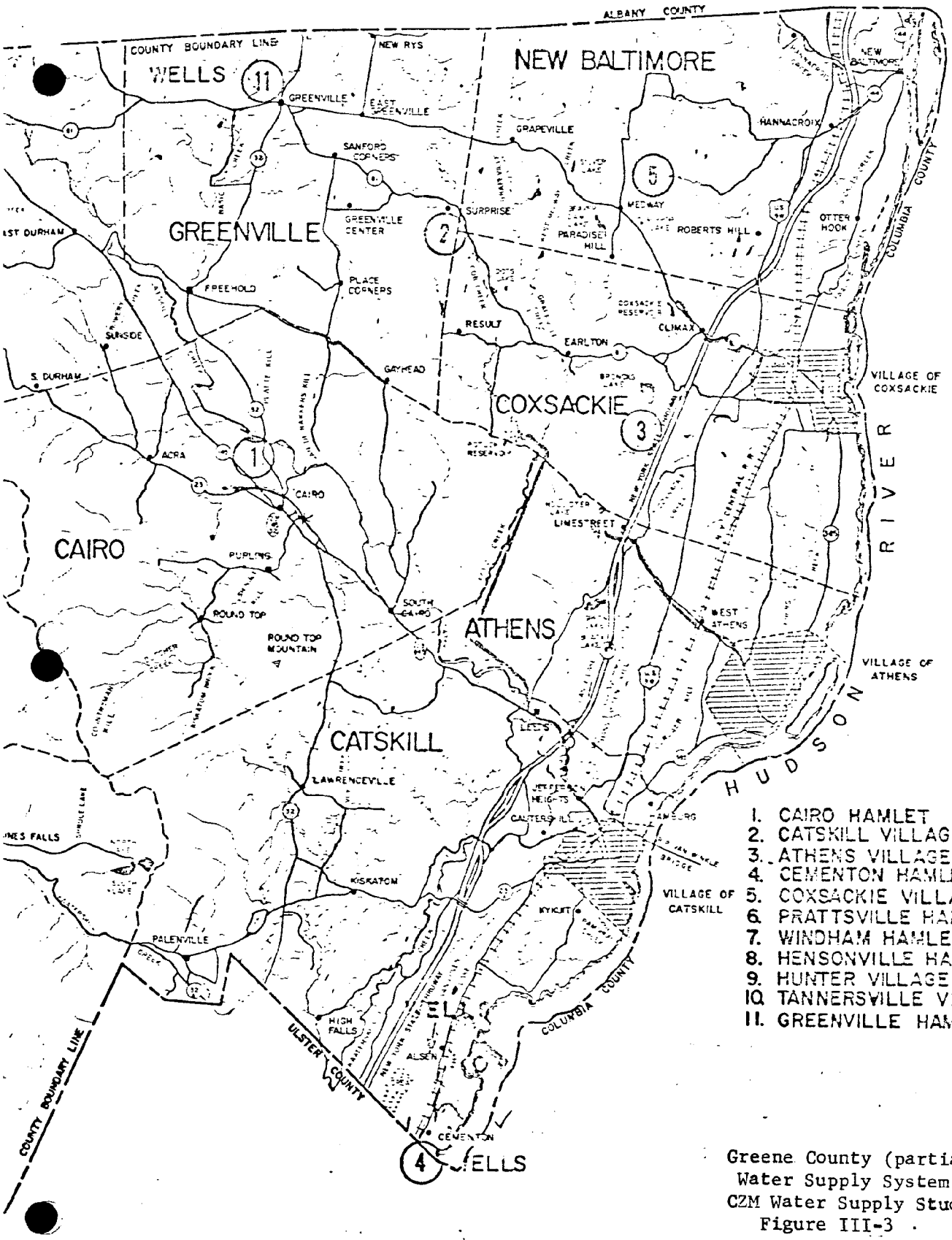
TABLE III-5

Existing Public Water Supply Systems
Coastal Zone Area

Greene County

Water System	Existing Sources & Capacity: Sources	System Capacity (MGD)	Projected Demand (MGD): 1967	2017	Alternatives to Meet Future Needs*
Catskill (V)	Potic Creek	1.22	0.70	1.50	County agency w/
Athens (V)	Hollister Lake	0.35	0.30	0.80	1. Hudson River & wells 2. Catskill Creek 3. Potic Creek 4. Ten Mile Creek
Cementon (H)	Wells**				
Coxsackie (V)	Murderers Kill	1.01	0.40	0.75	

* CPWS-25 considered regional agency only
** Cement plant plus a few homes on system



Greene County (partial)
Water Supply System
CZM Water Supply Study
Figure III-3

Columbia County

Columbia County is located on the easterly bank of the Hudson River immediately downstream (south) from Rensselaer County. The dominant industries include dairy and fruit products, textiles, cement, paper and local service-oriented concerns.

Almost all of the county including the area within the coastal zone drains westerly into the Hudson River. The major tributaries are Kinderhook Creek, Roeloff Jansen Kill and Claverack Creek. The potential coastal zone area is underlain by bedrock from the Normanskill Shale and Nassau Formations, which are not generally considered as high yielding aquifers. Surfacial glacial deposits overlie the bedrock formations resulting in high yielding aquifers near the stream channels.

Municipal Water Systems

The county has twelve public water supply districts. Four of these are located within the coastal zone area. The Village of Philmont (outside the coastal zone area) and the City of Hudson (within the coastal zone area) use surface water for their sources. The remaining water districts use groundwater. The water districts within the coastal zone are listed on Table III-6 and described below.

City of Hudson

In 1904, the City abandoned the Hudson River as a source and developed an upland supply system. The present sources are diversion dams on Taghkanic Creek and Churchtown Creek. The City also has a supplemental source, an abandoned limestone quarry, and two emergency sources, which are an infiltration gallery on Mill Creek within the City limits and an intake on Claverack Creek. The system is inadequate to meet projected demands. CPWS-32 recommended two alternatives. One alternative uses the Hudson

River as its source providing that the water quality was improved sufficiently to assure no recurrence of the epedemic conditions around 1900. The other alternative expands the Churchtown Reservoir and rehabilitates a major transmission main and pump station as its first phase. A reservoir located at the headwaters of Churchtown Creek with pumping facilities from Taghkanic Creek is the second phase.

Town of Greenport

In 1925 the Town formed Water District No. 1 and purchased the water supply facilities of the Hudson Aqueduct Company including Fountain Head Spring. Since then the District has developed three wells. The total yield of the system is estimated as 1.5 MGD. The potential development of a community college near the District indicates that additional groundwater development may be needed.

Town of Stockport

The Town has two water districts. In 1953, Water District No. 1 was formed to purchase a small private water system, which had a well as its source of supply near Claverack Creek in the Hamlet of Scottville. During the drought of the mid 1960's many individual wells went dry resulting in the formulation of Water District No. 2 and the construction of a caisson-type well near Kinderhook Creek. CPWS-32 recommends that the two districts combine their facilities. Future expansion would use new wells along Claverack Creek and/or Kinderhook Creek irregardless of the combined water district proposal.

Self Supplied Industrial Systems

The TAMS Study listed seven major industrial self supplied industrial water users. Of these two are located in the potential coastal zone area and are listed in Table III-7 The projected demands for the entire group was proportioned for each industry.

Boundary Line Determination

Nearly all of the water supply sources are located more than a mile from the Hudson River. The groundwater aquifers servicing the coastal zone area are located from 2 to 5 miles from the Hudson River. The infiltration gallery for the City of Hudson is located less than 3000 feet from the Hudson River. Since this is an emergency source which is recommended for abandonment, protection of this source is questionable.

Areas of Protection

Potential areas of protection are near the industrial intakes as well as the area surrounding the infiltration gallery for the City of Hudson. CPWS-32 identified a potential groundwater source adjacent to the Hudson River in the Town of Stuyvesant. Although there is no projected needs for this area, perhaps protection is needed.

TABLE III-6

Existing Public Water Supply Systems
Coastal Zone Area

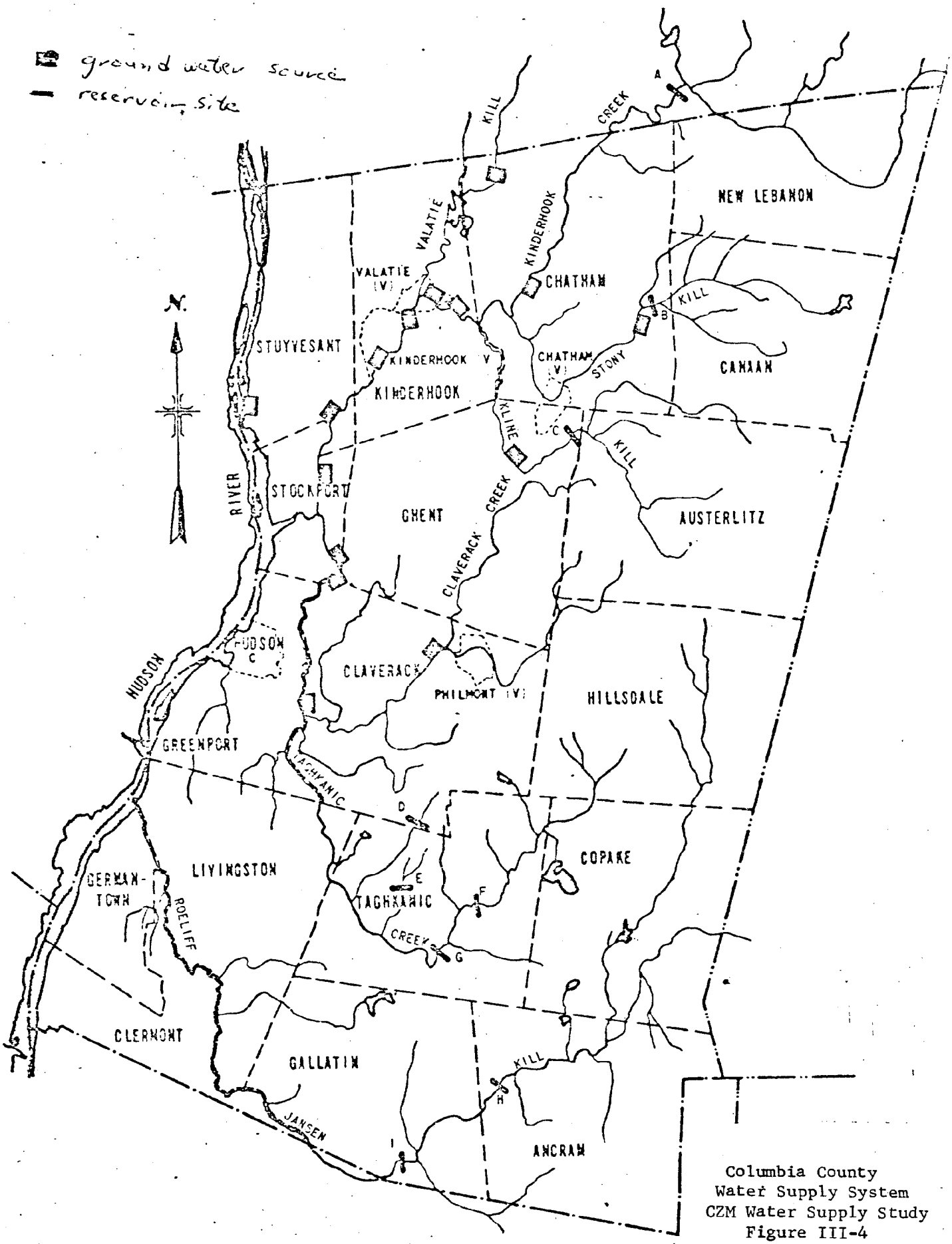
Columbia County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Hudson (C)	Taghkanic Creek Churchtown Creek Claverack Creek Groundwater (2)	1.67	1.54	1.92	2.56	Hudson River (?) Churchtown Creek Taghkanic Creek
Greenport (T) W. D. #1	Spring wells	1.50	0.41	0.73	1.29	Wells
Stockport (T)						
W. D. #1	Well	0.08	0.05	0.07	0.10	Wells
W. D. #2	Well	0.588	-	0.26	0.66	

TABLE III-7
Self-Supplied Industrial Water Systems
Coastal Zone Area
Columbia County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)*	Projected Demand (MGD)*: 1970	1990	2020	Alternatives to Meet Future Needs
Lone Star Cement	Hudson R. Cleverack Cr.	0.28	0.4	0.7	1.7	
Universal Atlas Cement	Hudson R.	0.45	0.6	1.1	2.7	
COLUMBIA COUNTY TOTAL**		2.70	3.4	6.6	16.4	

* 1965 withdrawal
** County Total Estimated in TAMS Recon. Report Proportioned to Nearest 0.1 MGD



Columbia County
Water Supply System
CZM Water Supply Study
Figure III-4

Ulster County

The county is located on the westerly bank of the Hudson River about halfway between New York City and Albany. The major employers are manufactures of electronic equipment, apparrel and textiles.

The western portion of the county drains southwesterly into the Delaware River. The eastern portion drains easterly into the Hudson River via Esopus Creek, Rondout Creek and several minor tributaries. The bedrock beneath the coastal zone area consists of slate and metamorphic shale overlain with deposits of glaciated drift.

Municipal Water Systems

The county has 26 public water supply systems, nine of which provide water to the coastal zone. Two systems use the Hudson River. Ground water is used by 18 systems within the county or 4 systems within the coastal zone. Surface water sources are used by 8 systems within the county or 3 within the coastal zone. Within the county 2 systems purchase water from other systems. Of these, only Glasco Water District is located within the coastal zone. The water systems within the potential coastal zone are listed in Table III-8 and are described briefly below.

Saugerties Water District

The Village of Saugerties takes its water from Blue Mountain Reservoir on Prattekill Creek. The village in turn sells part of its water to the Glasco Water District. The estimated yield of the system is 1.8 MGD. CPWS-15 recommends that this system be combined into a larger system taking water from the Catskill Aqueduct near Stone Ridge. Alternative regional systems considered the Hudson River or the Prattekill Creek as a source.

Glasco Water District

The District receives its water from the Saugerties water district, described above. Its estimated withdrawal capacity is 0.50 MGD. CPWS-15 recommends that this system be part of the system using the Catskill Aqueduct. Alternative regional systems considered the Hudson River or Prattekill Creek as a source.

Kingsvale Water Company

This company isn't described in detail except that it uses well capable of producing an estimated 0.18 MGD, which appears adequate to meet projected needs.

Town of Ulster Water District

This District obtains its water from a well near Esopus Creek. The yield of the well is estimated at 0.43 MGD. CPWS-15 recommends that this District be part of the system using the Catskill Aqueduct. Alternative regional system considered the Hudson River and Prattekill Creek as a source.

City of Kingston

The City diverts water from Mink Hollow Creek into the Cooper Lake storage area. The source has an estimated safe yield of 6.1 MGD. The projected demands for 2000 for the City are within the safe yield of the system. However, the projected demands for the smaller systems surrounding the city exceed the capacity of the combined systems even if they were interconnected. CPWS-15 recommends that the city join the combined system using the Catskill Aqueduct. Alternative regional systems considering the Hudson River and Prattekill Creek as a source.

Port Ewen Water District

The District diverts water from the Hudson River through a treatment plant having a capacity of 0.5 MGD. The system is supplemented by a well located near Plantasie Creek. The system is inadequate to meet projected demands. CPWS-15 recommends that this system be part of the system using the Catskill Aqueduct. Alternative regional systems considered the Hudson River and Prattekill Creek as a source.

Highland Water District

The District takes water from the Hudson River through a treatment plant with a capacity of 1.0 MGD. The system is inadequate to meet projected demands for 2000. CPWS-15 recommends that the District expand its plant to meet projected demands. Other alternatives were to expand the plant to meet demands for two districts to the south or to join these districts in using the Delaware Aqueduct.

Milton Water District

The District is supplied by wells capable of yielding 0.15 MGD. The system is inadequate to meet projected demands. CPWS-15 recommended that the District be part of a combined system using the Delaware Aqueduct. An alternative considered joining an enlarged system using the Hudson River at the Highland Plant.

Marlboro Water District

The District takes water from a reservoir west of the village and a well field along the Hudson River. The system is inadequate to meet projected demands. CPWS-15 recommends that the District be part of system using the Delaware Aqueduct. An alternative considered joining an enlarged system using the Hudson River at the Highland Plant.

Self Supplied Industrial Water Systems

The TAMS study reported seven industrial water users. Three of these are self supplied by well, but do not appear to be within the coastal zone area.

Boundary Line Determination

No major aquifers are located near the coastal zone area. The Marlboro and Port Ewen Water Districts as well as the Kingsvale Water Company take minor amounts of water from the ground. The exact location of these are not shown in CPWS-15, but they could be a determining factor.

Areas of Protection

In addition to the three areas above, two existing intakes could need protection. One of the alternative considerations to the recommended plan was a intake along the Hudson at a different location. Preservation of this area could be considered.

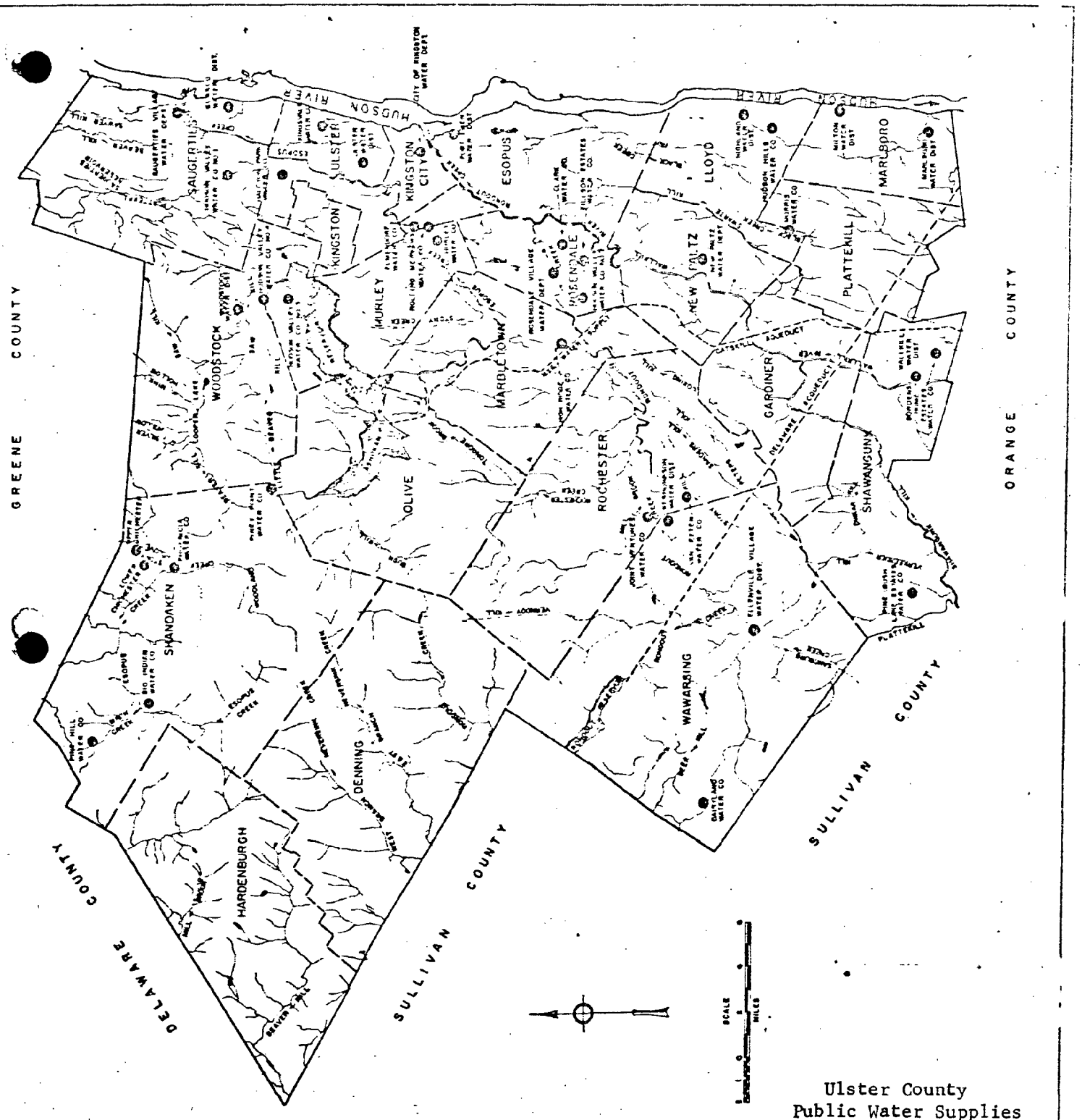
TABLE III-8

Existing Public Water Supply Sytems
Coastal Zone Area

Ulster County

Water System	Existing Sources & Capacity: Sources	System Capacity (MGD)	Projected Demand (MGD): 1970	1985	2000	Alternatives To Meet Future Needs
Saugerties W.D.	Prattekill Cr.	1.80	0.50	2.64	3.44	1. Catskill Aqueduct 2. Hudson River 3. Prattekill Creek
Glasco Water Co.	Saugerties	0.50	0.30			
Kingsvale Water Co.	Wells	0.18	0.30	1.76	2.96	NONE
Town of Ulster W.D.	Wells	0.43	0.25			a
Kingston (C)	Mink Hollow Cr.	6.10	4.00	4.80	4.88	a
Port Ewen W.D.	Hudson River well	0.50	0.30	1.20	1.60	a
Highland W.D.	Hudson River	1.00	0.75	1.20	1.60	1. Hudson River 2. Delaware Aqueduct
Milton W.D.	Wells	0.15	0.05	0.77	1.00	1. Delaware Aqueduct
Marlboro W.D.	Reservoir Wells	0.35	0.20			2. Hudson River

a - Part of regionalized system with Saugerties



Ulster County
Public Water Supplies
CZM Water Supply Study
Figure III-5

Dutchess County

Dutchess County is located about halfway between Albany and New York City along the easterly bank of the Hudson River. Its primary economic activity is associated with the machinery industries as well as the printing and publishing industries.

The eastern quarter of the county is drained by Tenmile River into Connecticut. The remainder drains into the Hudson River via Wappinger Creek, Fishkill Creek and several smaller tributaries.

Most of the potential coastal zone area is underlain by the Hudson River Formation, which is not generally classified as an aquifer. There are two strips of Stockbridge Limestone south of Poughkeepsie, which have a higher yield. Surficial deposits along the stream valley beds could also be considered as aquifers.

Municipal Water Systems

Dutchess County is the only county that doesn't have a comprehensive water supply study since they had just completed such a study when the state program began. A copy of this report wasn't available for Phase 1 of the CZM study. In a study for Southeastern New York, eighty-two water districts or companies were listed for Dutchess County. Of these, thirty-eight could be located within the potential coastal zone. These are listed on Table III-9. Only the City of Poughkeepsie and the Village of Rhinebeck use the Hudson River as a source. A more detailed description of the systems is impossible at this time.

Self Supplied Industrial Systems

The TAMS study reported five industries that have their own systems. One of these uses the Hudson River as a source. Table D-2 lists the industry with its projected demands.

Boundary Line Determination

Not enough is known to make a determination at this time.

Areas of Protection

The areas near the two municipal and the one industrial intakes may need protection.

TABLE III-9

Existing Public Water Supply Systems
Coastal Zone Area
Dutchess County

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
City of Beacon	reservoirs well	1.4				
Beacon Hills Water District	Beacon City					
Brinckerhoff Water Co.	well	0.76				
Dutchess Park Water Supply District	Brinckerhoff Water Co.					
Fishkill (village)	wells	1.1				
Glenham Water District	Fishkill (Village)					
Hudson View Water Works	wells	0.1				
Hyde Park Water and Fire Dist.	creek wells	1.15				
City of Poughkeepsie	Hudson River	12.0				
Poughkeepsie Water Dist.	Poughkeepsie City					

Dutchess County
(Cont'd)

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Red Hook (village)	wells	0.25				
Tivoli (village)	wells	0.11				
Rhinebeck (village)	Hudson River	1.0				
Rhinecliff Water District	Rhinebeck (village)					
Fishkill Park Apartments	wells	0.02				
Pleasant Manor Apartments	well					
Cove View Apartments	well					
Dutchess Estates Water Co.	wells	0.08				
Greenfield Water Co.	well	0.22				
Harbourd Hills Water Co.	well	0.15				
Haviland Apartments	wells	0.02				
Ki-Fi Apartments	wells	0.012				
Partridge Hill Apartments	wells	0 .02				

Dutchess County
(Cont'd)

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Quaker Hill Estates						
Royal Crest Apartments	wells	0.02				
South Cross Road Water Co.	wells	0.32				
Staatsburg Water Company	wells reservoir	0.06				
Valkill Park East	wells					
Canterbury Gardens Apartments	wells	0.12				
Country Club Terrace Apartments	wells	0.07				
Hudson River State Hospital						
Sunny Slopes Water Company	well	0.03				
Annandale Water Works, Inc.	wells	0.08				
College Park Water Company	wells	----				
Rokeby Gardens	well	0.07				

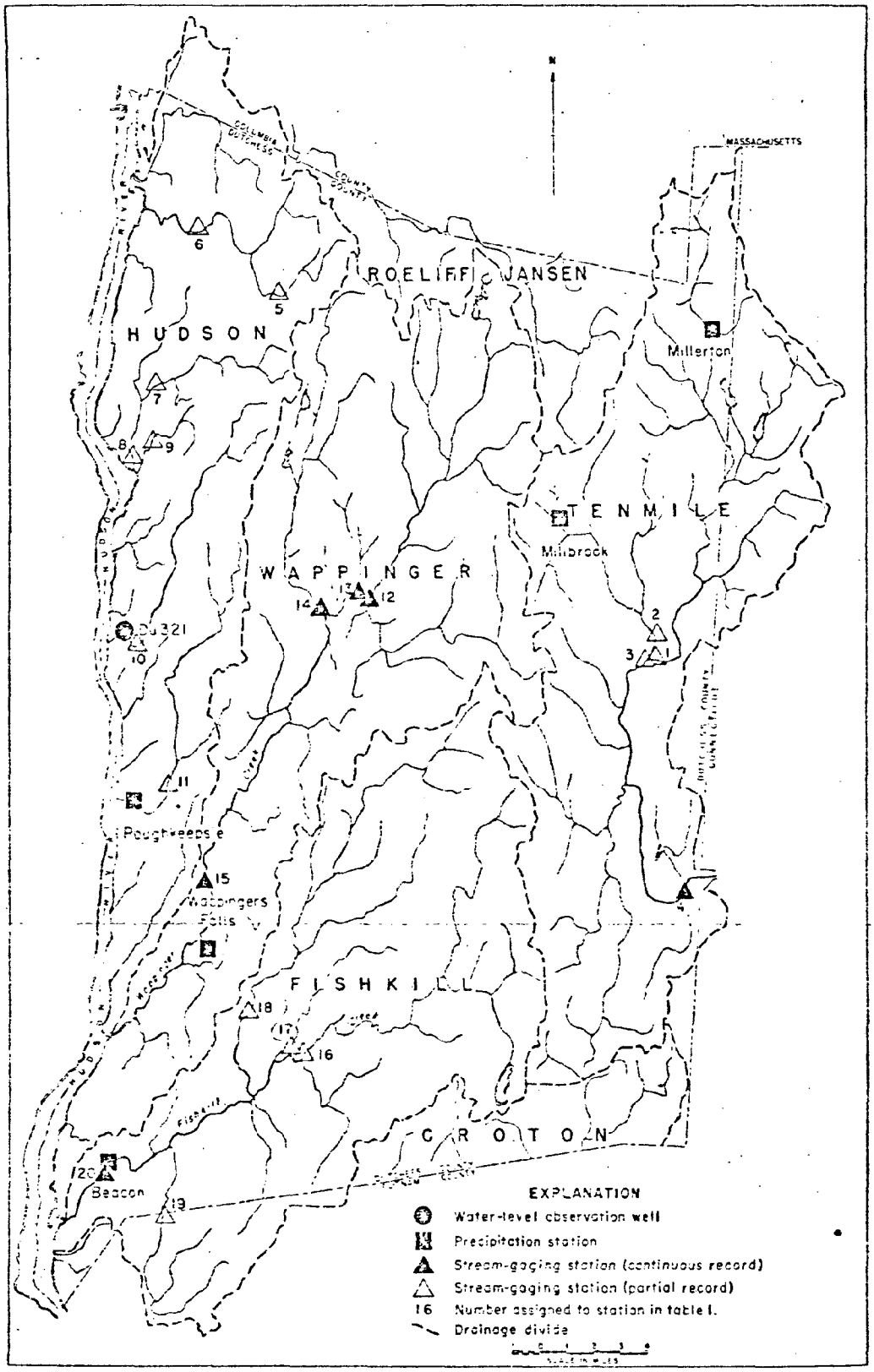
Dutchess County
(Cont'd)

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Windmere Highland Water Company	well	0.18				
Harlem Valley State Hospital						
Merritt Industrial Park						

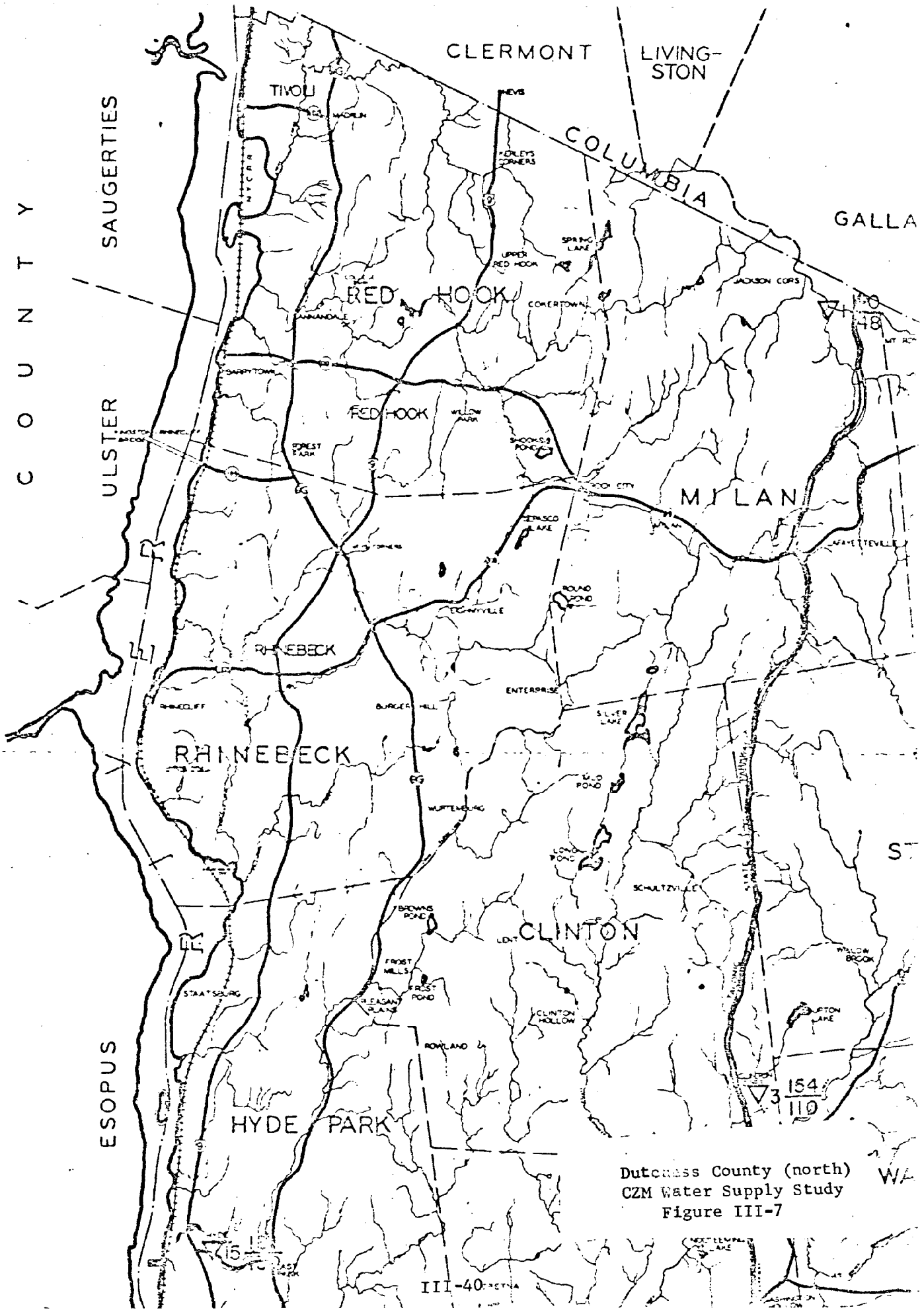
TABLE III-10
Self-Supplied Industrial Water Systems
Coastal Zone Area
Dutchess County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)*	Projected Demand (MGD)**: 1970	1990	2020	Alternatives to Meet Future Needs
IBM - Poughkeepsie	Hudson R.	24.00	31.7	80.0	267.0	
DUTCHESS COUNTY TOTAL**		25.71	34.0	85.7	286.0	

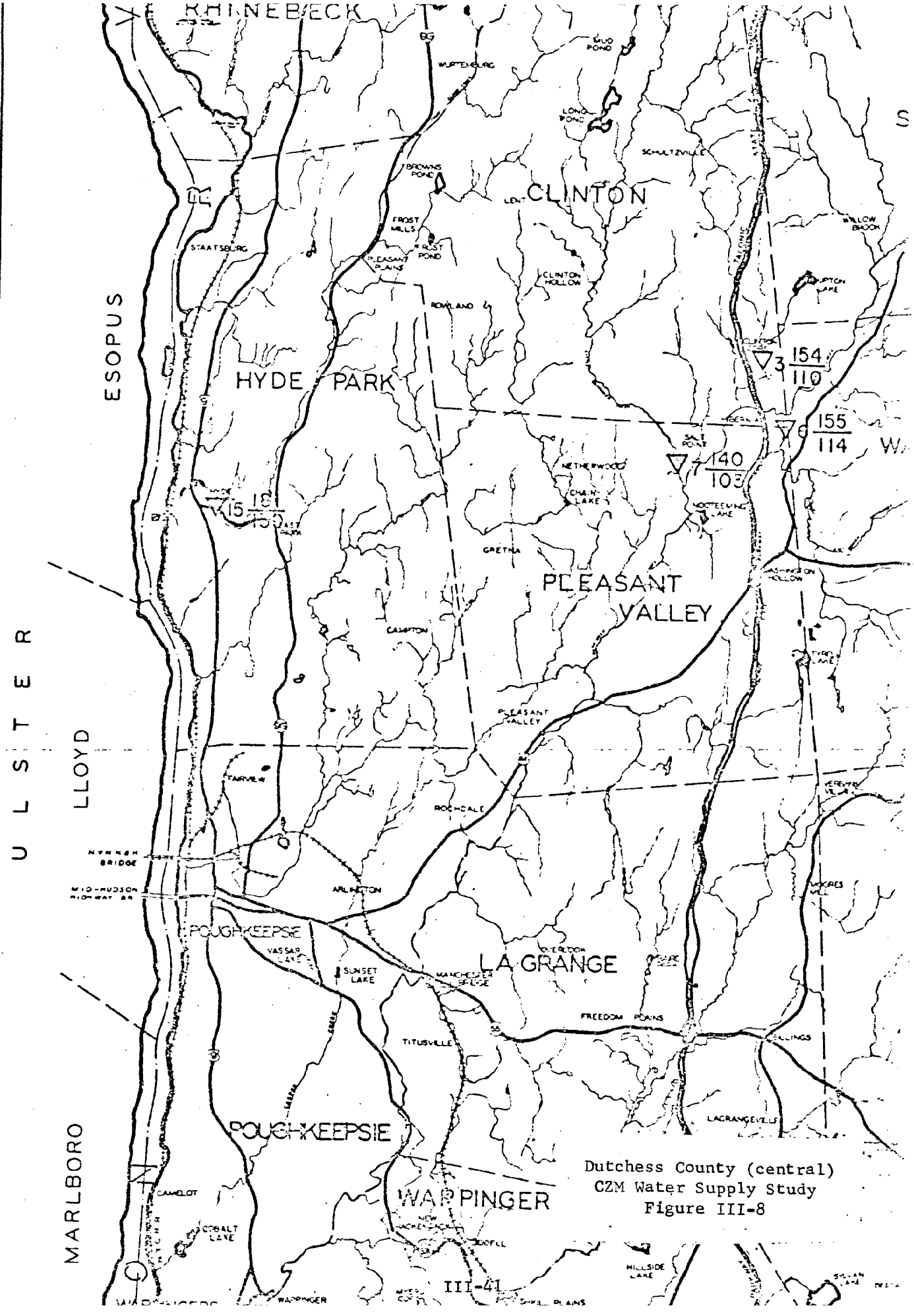
* 1965 withdrawal
** County Total Estimated in TAMS Recon. Report Proportioned to Nearest 0.1 MGD



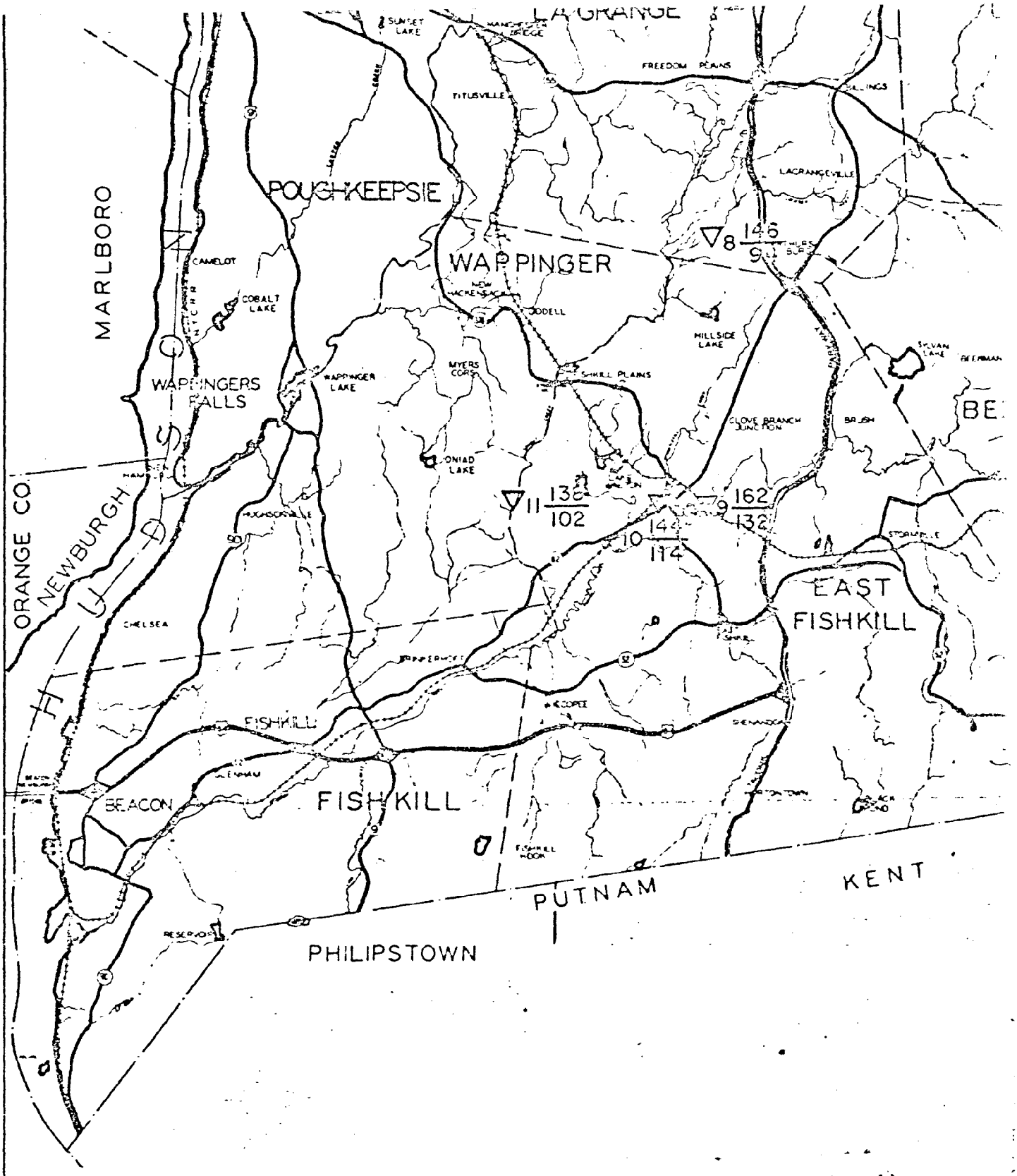
Dutchess County
Drainage Basins
CZM Water Supply Study
Figure III-6



Dutchess County (north)
CZM Water Supply Study
Figure III-7



Dutchess County (central)
CZM Water Supply Study
Figure III-8



Dutchess County (south)
CZM Water Supply Study
Figure III-9

Orange County

Orange County is located along the west bank of the Hudson River with its center about 50 miles from New York City. Employment at present comes mainly from agricultural persuits. However, projected future growth is expected from business activities associated with urbanization.

The county drains into three major watersheds. The western portion drains into the Delaware River. The southern part drains into the Ramapo River, a Passaic River tributary. The remainder of the county drains into the Hudson River via the watersheds of Wallkill Creek, Moonda Creek or other minor tributaries.

No major aquifers are located in the potential coastal zone area. The bedrock formation of carbonate rocks, shale and crystalline rocks produce low yielding wells. Only one higher yielding aquifer from the surfacial glaciated deposits occurs near Moodna Creek. The estimated yield is in excess of 1 MGD, but the presence of manganese causes a water quality problem.

Municipal Water Systems

Six of the twenty-seven municipal water supply systems in Orange County are within the possible coastal zone area. Groundwater is used as a source for all or part of their supply for 15 municipal systems or two systems within the coastal zone. Surface sources provide part or all the water supply for 17 systems of which five are within the coastal zone. The Village of Cornwall (within the coastal zone) also uses the Catskill Aqueduct for an emergency source of supply. Table III-11 lists the municipal water supply systems within the potential coastal zone area which are described briefly below.

Newburgh Consolidated Water District

In 1966, the District was formed integrating numerous community and private systems and developing Chadwick Lake as a source. The estimated safe yield of

the source is 4.9 MGD. CPWS-4 considered three alternatives which included using the Delaware Aqueduct, raising the Chadwick Lake dam and using flood skimming techniques from neighboring Gidneytown Creek.

City of Newburgh

The City's sources of water supply are from the drainage basins of Patton Brook, Silver Creek and Washington Lake. In 1854, Lake Washington was developed as a water supply source after groundwater sources became inadequate. As demands increased, Lake Washington was raised; diversions were made into Lake Washington from Patton Brook and Silver Stream; and then Silver Stream Reservoir (Brown's Pond) was constructed upstream from the diversion. Lockwood Basin immediately downstream from Lake Washington catches the overflow from the Lake, and is used as an emergency source. In 1919 and in 1965, water was diverted from the Catskill Aqueduct into Silver Stream. The existing system has an estimated yield of 3.8 MGD. CPWS-4 recommends that a supplemental supply be obtained by making a diversion from Drury Lane Creek to Washington Lake and a permanent connection to the Catskill Aqueduct.

Town of New Windsor

The Town's water supply is groundwater obtained from three well fields having a combined yield of 1.0 MGD. A caisson well located near Moodna Creek fluctuates with the tidal flows of the Hudson River, but tests show that the water quality is nearer to that of Moodna Creek. The Schoonmake well and the Little Falls Pond well field (5 wells) are drilled at different locations and are not subject to the Hudson River. Part of the system is interconnected with the City of Newburgh. CPWS-4 considered either purchasing water from the City of Newburgh or becoming part of a larger system using the Catskill Aqueduct as a source.

Village of Cornwall

CPWS-4 is dated in regards to this system. The village has three general sources, which are the Black Rock Forest System, the Mountainview Well System

and the Catskill Aqueduct Supply. The safe yield of the entire system is 3.0 MGD. The Black Rock Forest System consists of Aleck Meadow Reservoir, Authur Pond, Sphagnum Pond, Tamarack Pond, and Upper Reservoir. Consolidated Edison was to flood out the Upper Reservoir for their pumped storage hydroelectric project. The mountainville well system consists of two wells along Moodna Creek. The village is restricted to a maximum withdrawal of 1 MGD due to the use of the aquifer for irrigation by Glenoden Farms and Star Industries. The Catskill Aqueduct was a new connection in 1967. CPWS-4 considered various alternatives using the Catskill Aqueduct as a source for the village.

Village of Highland Falls

The village obtains its water from two reservoirs on Highland Falls Creek also known as Buttermilk Falls Brook. Water is released from the two reservoirs, Bog Meadow Pond and Jim's Pond, to an intake downstream. The yield of the system is estimated as 0.5 MGD. CPWS-4 recommends purchase of water from the West Point System or the development of a reservoir on Glycerine Hollow Brook.

West Point

The United States Military Reservation at West Point takes water from the Popolopen Brook and Queensboro Brook Watersheds. The yield of the system is estimated as 4 MGD. Although there are several lakes within the watershed, only Stilwell Lake on Popolopen Brook is used as a source for the Academy. Some of the lakes on Queensboro Brook are used by the Palisades Interstate Park. The planned expansion of the Academy (1967) included additional treatment facilities using Stilwell Lake as its source.

Self Supplied Industrial Systems

The TAMS study listed seven self supplied industrial water users. Of these only one appears to be located with the possible coastal zone and is summarized in Table III-12.

Boundary Line Determination

Nearly all sources are located outside the potential coastal zone. The aquifer along Moodna Creek might be considered. The exact location or extent of the wells aren't known by the writer. Other than that the location of the boundary line doesn't appear important.

Areas of Protection

The recharge areas along Moodna Creek appear likely for protection. In addition, the area in the vicinity of the industrial water intake may require protection. Field surveys will determine extent.

TABLE III-11

Existing Public Water Supply Systems

Coastal Zone Area

Orange County

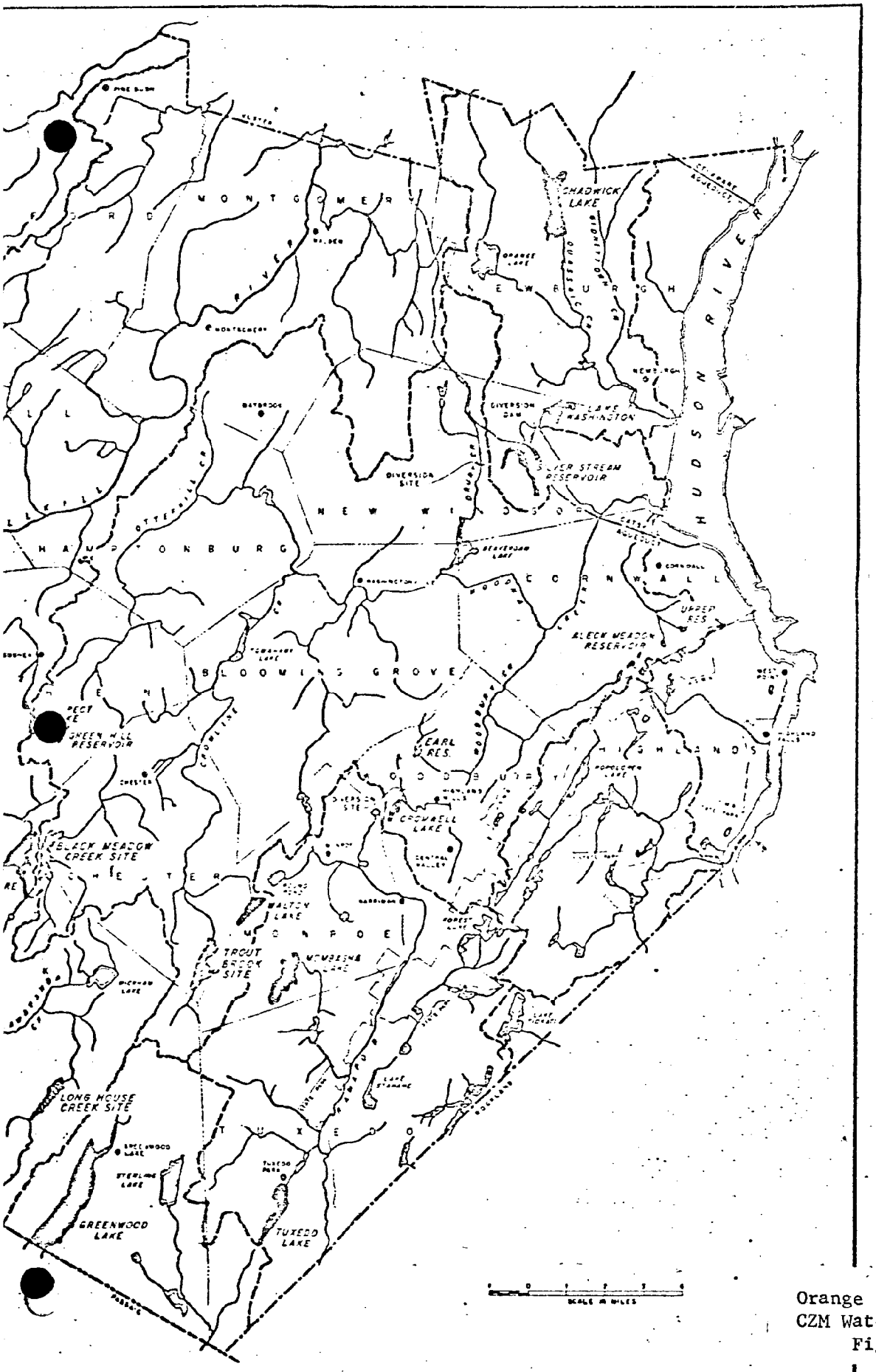
Water System	Existing Sources & Capacity: Sources	System Capacity (MGD)	Projected Demands (MGD): 1965	1995	2020	Alternatives to Meet Future Needs
Newburgh Consolidated Water District	Chadwick Lake	4.9	0.4	6.4*	10.8*	Chadwick Lakes Expansion Catskill Aqueduct Gidneytown Creek
Newburgh (C)	Patton Brook Silver Stream Washington Lake	3.8	3.6	4.9	6.1	Drury Lane Creek Catskill Aqueduct
New Windsor	Wells	1.0	0.7	6.0*	10.1*	Newburgh (C) System Catskill Aqueduct
Cornwall (V)	Black Rock Forest System	0.73	0.8	3.5	5.8	Catskill Aqueduct
	Wells	1.0				
	Catskill Aqueduct	1.5				
Highland Falls (V)	Highland Falls Brook	0.5	0.4	0.9	1.4	West Point System Glycerine Hollow Brook
West Point	Queensboro Brook Popolopen Brook					

*Table in CPWS-4 appears to be in error for these figures

TABLE III-12
Self-Supplied Industrial Water Systems
Coastal Zone Areas
Orange County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)*	Projected Demand (MGD)**: 1970	1990	2020	Alternative to Meet Future Needs
Central Hudson Gas & Electric Corp.	Hudson R.	260.00	300	525	900	
ORANGE COUNTY TOTAL**		263.90	309	531	907	

* 1965 Withdrawal
** County Total Estimated in TAMS Recon. Report Proportioned to Nearest MGD



Orange County (partial)
CZM Water Supply Study
Figure III-10

Putnam County

Putnam County is located about 50 miles north of New York City along the easterly bank of the Hudson River. The major economic activity in the county is oriented towards servicing the resident population and vacation resorts. The county could be considered a bedroom community for New York City commuters.

The eastern half of the county drains sourtherly via the Croton River Watershed. The western half drains into the Hudson River via Peekskill Hollow Creek, Canopus Creek, Clove Creek, Fishkill Creek and several smaller tributaries.

The coastal zone area is underlain with crystaline rock which delivers groundwater through cracks and fissures that are difficult to locate. There is a fairly large surficial deposit of glaciated drift located just south of Cold Spring, which could be considered as an aquifer. However, very little subsurface information is available for that area.

Municipal Water Systems

The county has 78 municipal water supply systems. Of these 4 are within the potential coastal zone area. Groundwater is the source for 54 of the systems within the county, but is not in use within the coastal zone. All 4 systems within the coastal zone totalling 21 through the county use surface water as a source. The 4 systems within the coastal zone are listed in Table III-3 and described briefly below.

Cold Spring Water Department

The Cold Spring Water Department supplies water to the villages of Cold Spring and Nelsonville from an intake on Foundry Brook. The overflow from two reservoirs upstream from the intake is sufficient to meet demands during most of the year. Releases are made from the reservoirs in dry periods to meet the demands. The Department has tapped the Catskill Aqueduct on an emergency basis.

CPWS-16 recommended that groundwater be developed to meet future demands after considering a permanent tap to the Catskill Aqueduct and reservoirs on Foundry Brook and Clove Creek.

Highland Public Society, Inc.

The Highland Public Society, Inc. also known as the Garrison Water Supply provides water from a spring developed in 1906. The spring provides an average of 0.002 MGD to the unincorporated area called Garrison. CPWS-16 recommended that this area join the Cold Spring Water Department in developing a source.

St. Basil's Academy

St. Basil's Academy is supplied with an average of 0.01 MGD from Indian Brook. The academy is near the Garrison area. Therefore, CPWS-16 did not evaluate any new sources for this system.

Monastery of Mary Immaculate

The Monastery of Mary Immaculate is supplied with an average of 0.02 MGD from Local Brook. The Monastery is located near the Garrison area. Therefore CPWS-16 did not evaluate any new sources for this sytem.

Self Supplied Industrial Systems

The TAMS Study listed only one self supplied industry, which does not appear to be within the coastal zone.

Boundary Line Determination

Inclusion of the potential aquifer just south of the Village of Cold Spring deserves consideration. Since very little is known about this area geologically due to lack of development, its exact value is unknown.

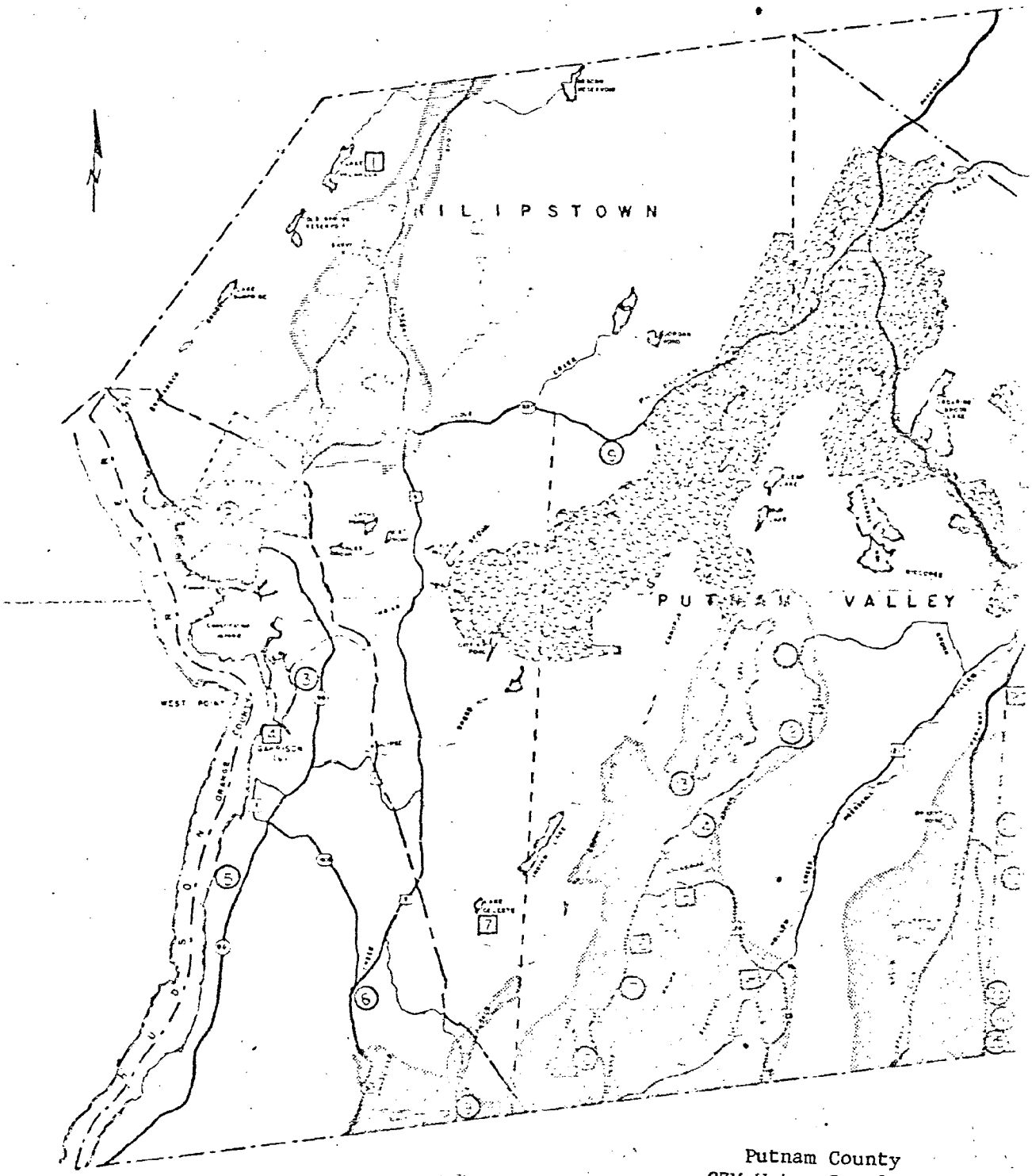
Areas of Protection

The aquifer mentioned above is the only potential area.

TABLE III-13

Existing Public Water Supply Systems
Coastal Zone Area
Putnam County

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (MGD)	Projected Demand (MGD): 1970	Projected Demand (MGD): 1990	Projected Demand (MGD): 2020	Alternatives to Meet Future Needs
Cold Spring Water Dept.	Foundry Brook Catskill Aqueduct	0.16				1. Catskill Aqueduct 2. Groundwater 3. Foundry Brook 4. Clove Creek
Highland Public Society	Spring					1. Groundwater 2. Catskill Aqueduct
St. Mary Immaculate	Local Brook					
St. Basil's Academy	Indian Brook					



Putnam County
CZM Water Supply Study
Figure III-11

Rockland County

Rockland is the most southerly county along the west bank of the Hudson River in New York State. It has become urbanized due to its access to markets in northern New Jersey and New York City via the Thruway and the Tappan Zee Bridge.

The county is drained by three watersheds, the Passaic River to the southwest, the Hackensack River to the south and the Hudson River to the north and east. The major streams draining through the coastal zone area are Minisceongo Creek and Sparkill Creek.

The coastal zone area is underlain by four different types of rock formations of which only the Newark group could be considered an aquifer. In addition, there are surficial deposits of stratified drift which can produce high yielding wells.

Municipal Water Systems

The county has six municipal water supply systems of which two are within the potential coastal zone area. Five systems including both systems within the coastal zone use surface water for part or all of their supply. Three systems including one within the coastal zone use groundwater for part or all of their supply. The systems within the coastal zone are listed in TableIII-14 and described briefly below.

Spring Valley Water Company

The Spring Valley Water Company is an investor owned subsidiary of the Hackensack Water Company of New Jersey. The utility's service area includes most of Rockland County. The company has two surface sources, Lake DeForest on the Hackensack River and a reservoir on Cedar Pond Brook. In addition, the Company has 42 wells and springs. The estimated legal yield of the system is 24.65 MGD. The yield of Lake DeForest reservoir is estimated to be over 20 MGD, but court decisions restrict its allowable use to 9.25 MGD.

CPWS-67 recommended the construction of Ambrey Pond Reservoir on Cedar Pond Brook, then the development of more groundwater resources, and then the raising of the DeForest Reservoir.

Nyack Water Company

The Village of Nyack serves the Village and the surrounding towns from an intake along the Hackensack River. The Village has the right to take up to 3 MGD from the River, CPWS-67 could not find an alternate source.

Self Supplied Industrial Systems

The TAMS study listed eight self supplied industrial systems none of which appear to be within the potential coastal zone area.

Boundary Line Determination

With the exception of two of the 42 wells owned by the Spring Valley Water Company, the coastal zone is supplied from outside sources. The line's location appears unimportant.

Areas of Protection

The recharge areas for the well system might be considered if they can be located.

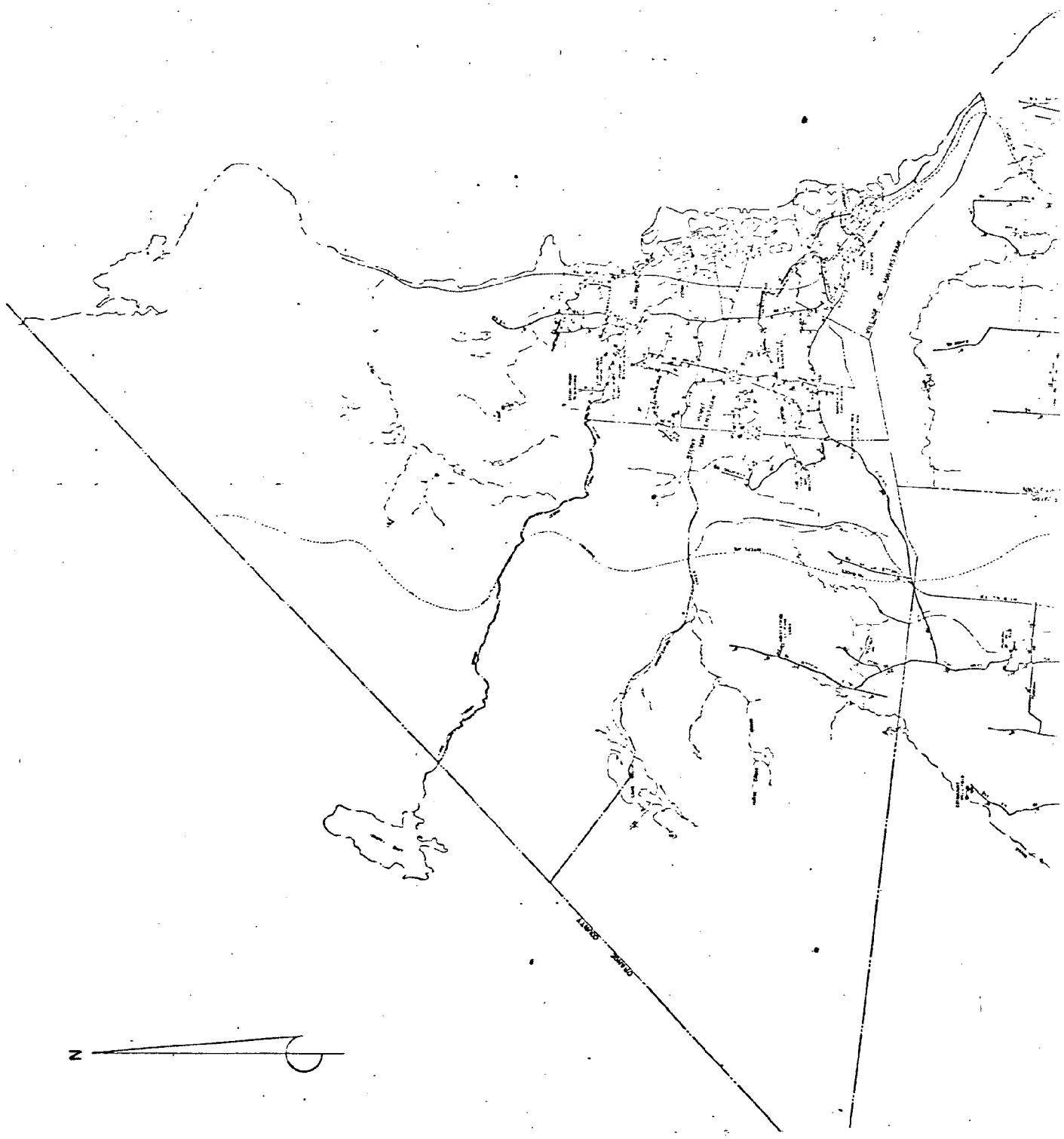
TABLE III-14

Existing Public Water Supply Systems

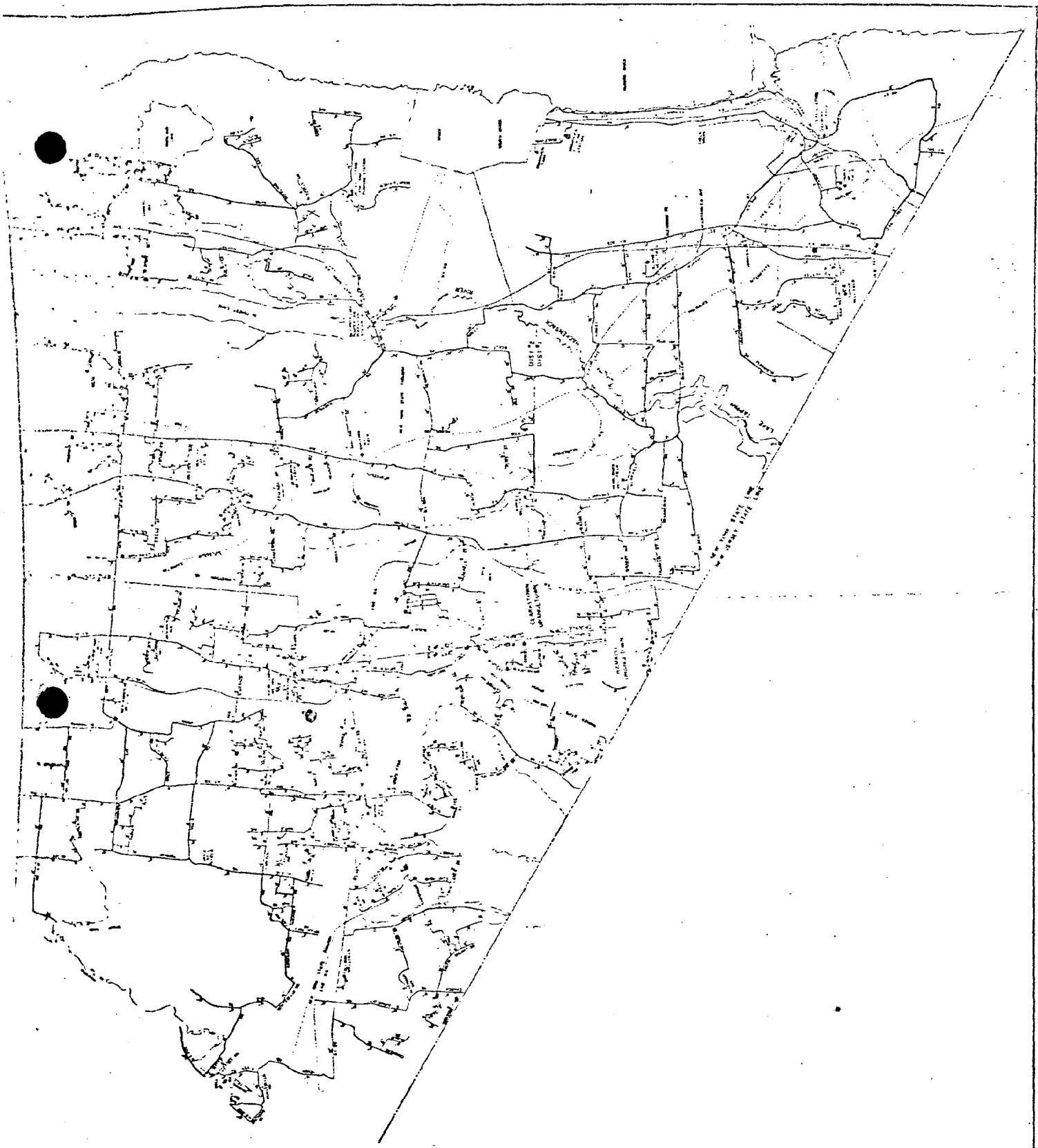
Coastal Zone Area

Rockland County

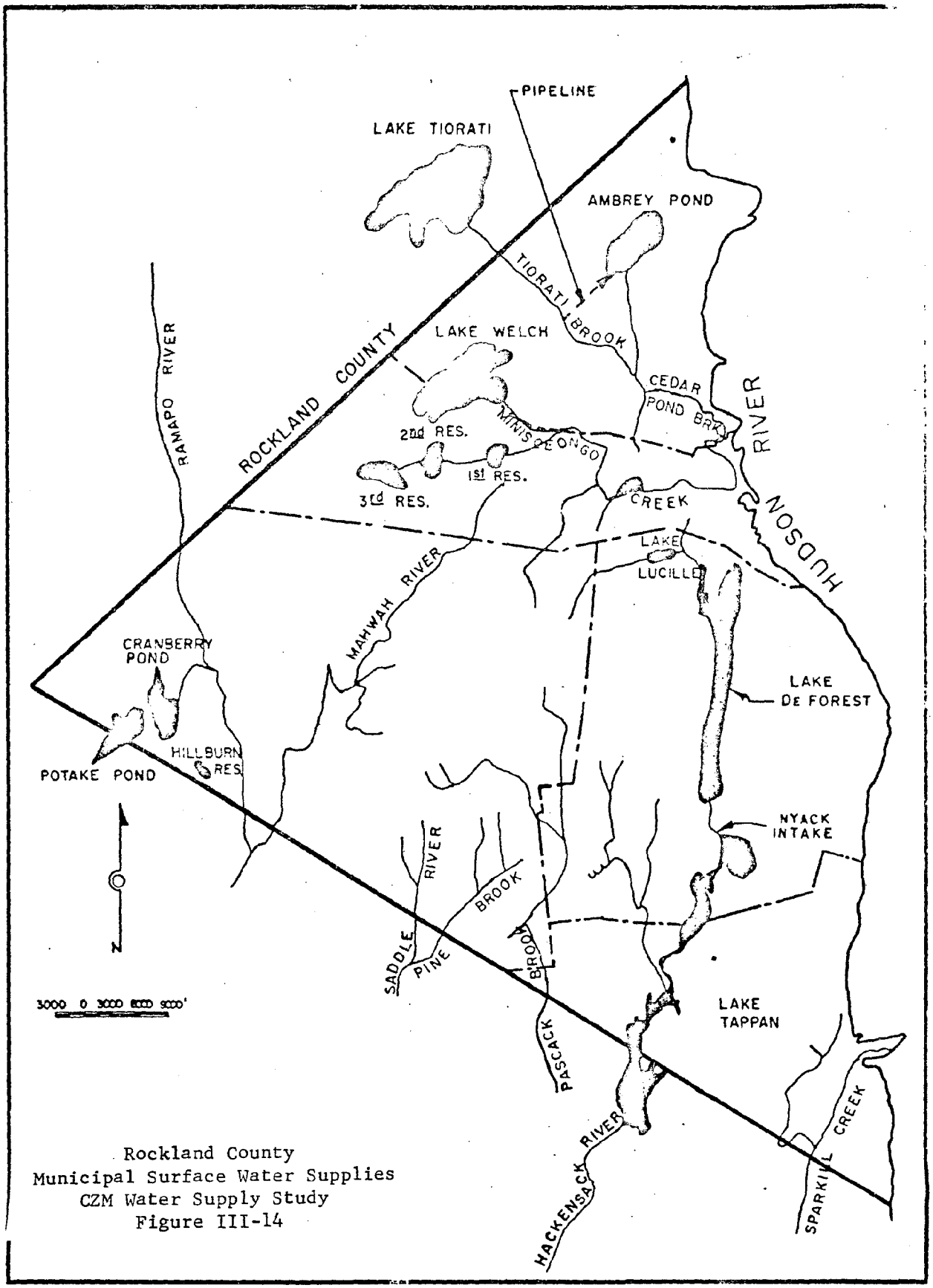
Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1966	1985	2020	Alternatives To Meet Future Needs
Spring Valley	Lake DeForest	9.25	14.66	33.0	58.0	Cedar Pond Br. groundwater Lake DeForest Exp. Ramapo River
	Cedar Pond Br.	0.4				
	42 wells & springs	15.0				
Nyack Water Company	Hackensack River	3.0	1.34	2.6	3.3	Hackensack River Expansion



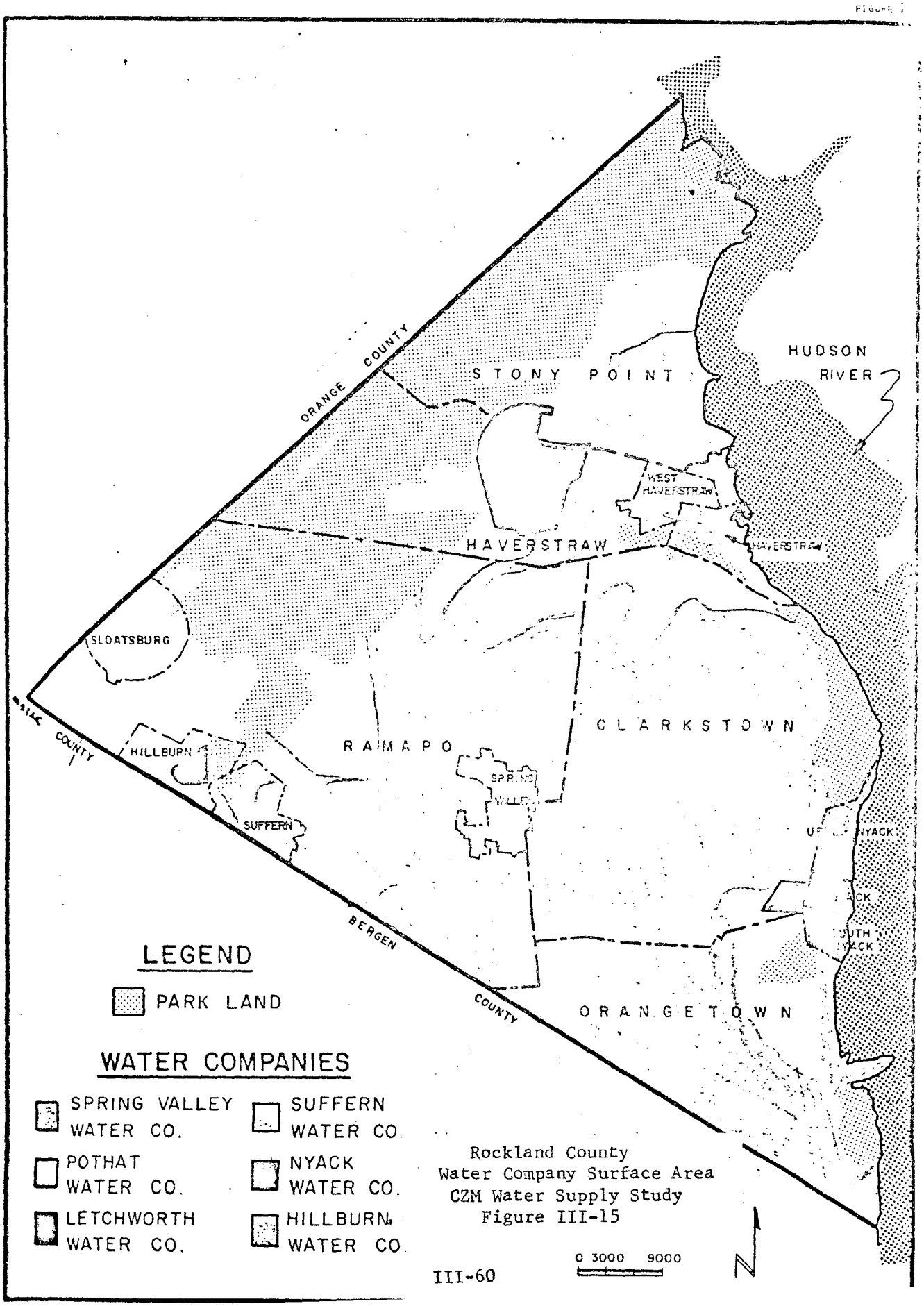
Spring Valley Water Company, Inc. (north)
CZM Water Supply Study
Figure III-12



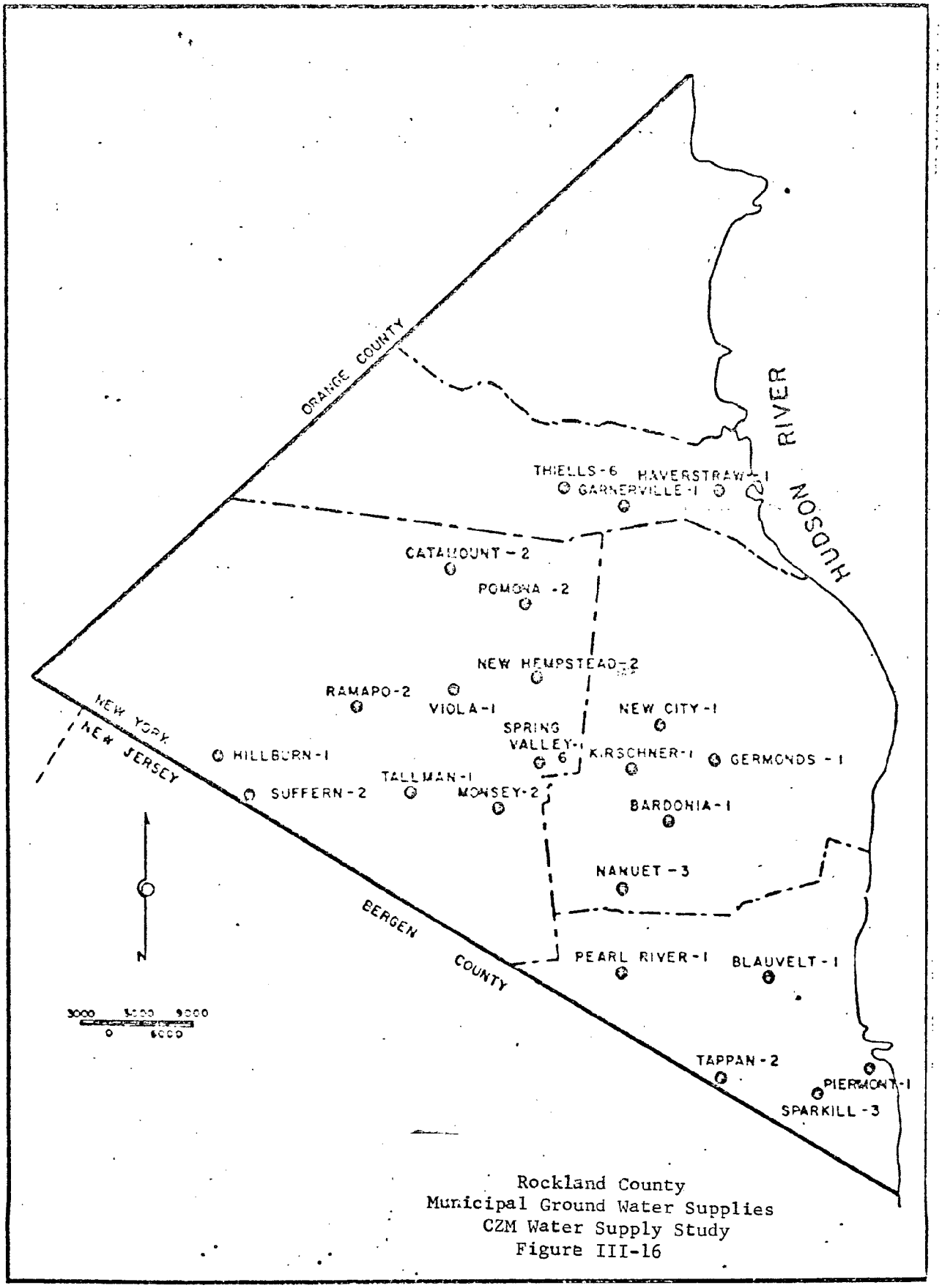
Spring Valley Water Company, Inc. (south)
CZM Water Supply Study
Figure III-13



Rockland County
Municipal Surface Water Supplies
CZM Water Supply Study
Figure III-14



Rockland County
Water Company Surface Area
CZM Water Supply Study
Figure III-15



Rockland County
Municipal Ground Water Supplies
CZM Water Supply Study
Figure III-16

Westchester County

Westchester County is located immediately north of New York City, along the east bank of the Hudson River and along the northerly shore of Long Island Sound. The major economic activity comes from services and retail trades since many people commute to New York City.

The northern and eastern portions of the County drain into the Hudson via the Croton River, Peekskill Hollow Brook and other smaller tributaries. The southwesterly portion of the county drains into Long Island Sound.

Municipal Water Systems

Westchester County has 44 water districts or companies. Of these 21 use groundwater sources and 35 use surface sources for part or all of their supply. The water supply system within the potential coastal zone are listed in Table III-15 for the Hudson River reach and in Table III-16 for the Long Island Sound reach. Although detailed descriptions of all of the companies are not available at present, all but the Briarcliff Manor Village system are presently tapping either the Catskill Aqueduct or the Croton River system. It could easily be assumed that the water resources of Westchester County are nearly fully developed.

Self Supplied Industrial Systems

The TAMS study listed only Columbia University out of seven self supplied industries as using the Hudson River as a source. Since no consumptive use was noted no future demand were estimated.

Boundary Line Determination

The county is highly urbanized and is starting to depend on water from the Catskill Aqueduct. The coastal zone area is adjacent to salt water sources, which are not high desirable for water supply purpose. Ground water

sources do not appear to be available in sufficient quantities. The boundary line is unimportant for water supply purpose.

Areas of Protection

Based on the above discussion, there are no areas for protection either

Table III-15

Existing Public Water Supply Systems
Coastal Zone Area
Westchester County
(Hudson River)

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Town of Cortlandt						
Cortlandt Water District #1	Catskill Aqueduct					
Croton-on-Hudson (village)	wells	3.22				
Montrose Consolidated Water District	Catskill Aqueduct					
Peekskill City	brook					
	Catskill Aqueduct					
Town of Ossining						
Briarcliff Manor (village)	well	3.5				
Ossining (village)	wells					
	brook					
	Croton System					
Ossining Water Districts						

Table III-15 (Cont'd)

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Town of Mount Pleasant						
Hawthorne Improvement District	Catskill Aqueduct					
North Tarrytown (village)	Croton System					
Old Farm Hill Water District	New Castle Water Co.					
Pleasantville (village)	wells Catskill Aqueduct					
Thornwood Water District	wells Catskill Aqueduct					
Valhalla Water District	Catskill Aqueduct					
Town of Greenburgh						
Elmsford (village)	Catskill Aqueduct					
Greenburgh Consolidated Water District	Catskill Aqueduct					
Irvington (village)	lake Croton System					
Tarrytown (village)	lake Croton System					

Table III-15 (Cont'd)

Water System	Existing Sources & Capacity: Sources	System Capacity (mgd)	Projected Demand (mgd): 1970	1990	2020	Alternatives to Meet Future Needs
Yonkers City	river, reservoir Catskill Aqueduct Croton System					

Table III-16

Existing Public Water Supply Systems
Coastal Zone Area
Westchester County
Long Island Sound

Water System	Existing Sources & Capacity: Sources	Existing Sources & Capacity: System Capacity (mgd)	Projected Demand (mgd): 1970	Projected Demand (mgd): 1990	Projected Demand (mgd): 2020	Alternatives to Meet Future Needs
Town of Rye						
Port Chester Water Co.	Greenwich Water Co.	7.25 (Legal Limit)				
Town of Mamoroneck						
Larchmong (village)	lake Catskill Aqueduct					
City of New Rochelle						
New Rochelle Water Company	lakes Catskill Aqueduct Croton System					
Town of Pelham						
Pelham (village)	New Rochelle Water Co.					

Major Water Supplies
Westchester & Fairfield Counties
CZM Water Supply Study
Figure III-17

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SECTION IV

NEW YORK CITY SUBAREA

GENERAL

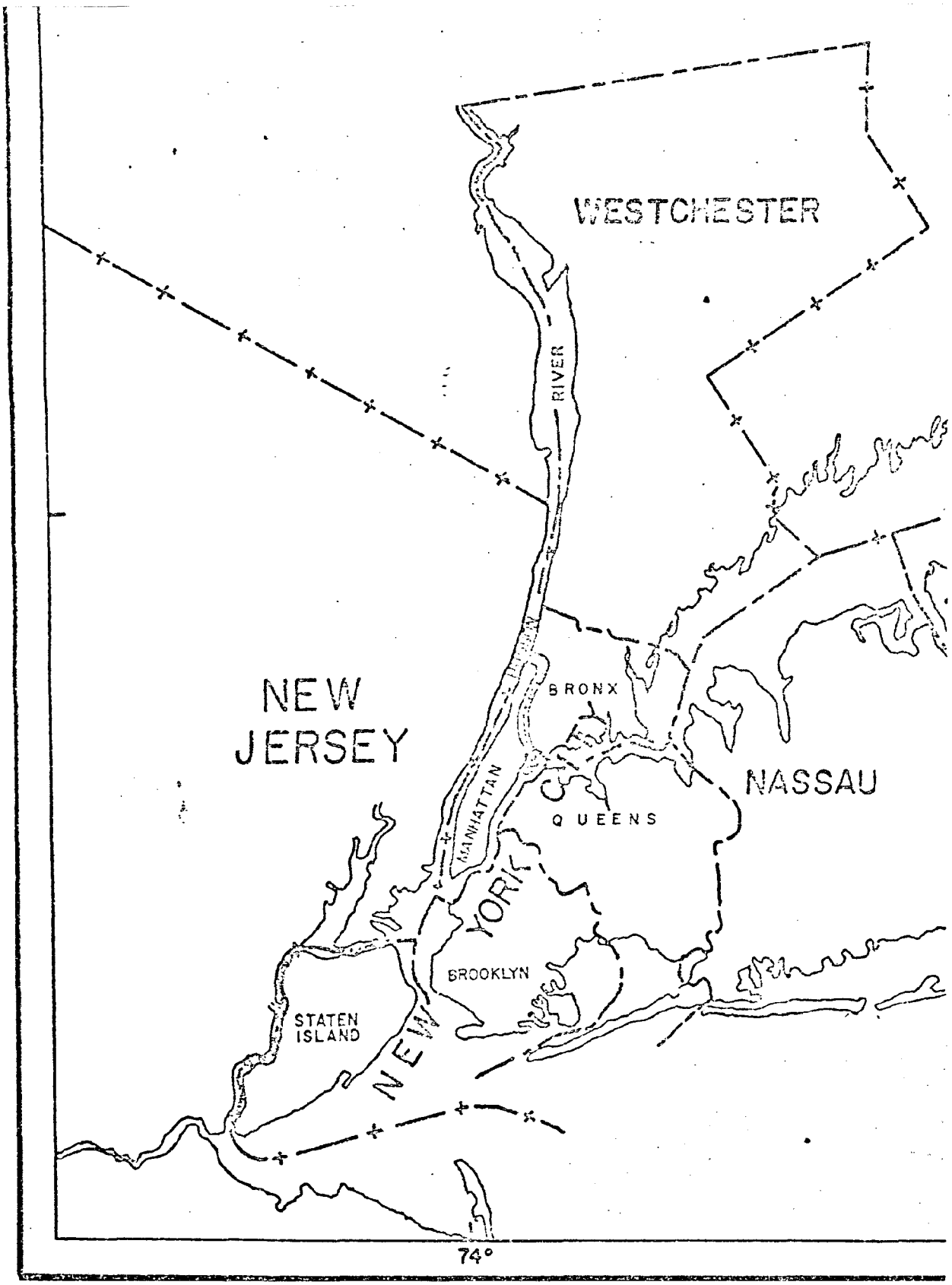
The New York City Sub-Area consists of five boroughs; Bronx, Brooklyn, Manhattan, Queens and Richmond. It includes a small piece of land along the lower Hudson River, portions of the Bronx River Watershed, and the Manhattan and Staten Islands. Present population of the City is estimated at 8,000,000.

Population densities in the four major City boroughs range from 18,000 persons per square mile in Queens to 68,000 persons per square mile in Manhattan. The least developed borough in the City, Richmond also has an average density of 4,500 persons per square mile. The study area is thus one of the most densely populated regions of the Nation. Furthermore, the study area contains the Nation's largest concentration of financial, trade, professional, business and communications services. Therefore, the water supply requirement is by far the most important water problem.

Shoreline extends for more than 100 miles in the sub-area. It includes the coastline along the Atlantic Ocean, Long Island Sound as well as the lower reach of the Hudson River. Most of the shoreline has been developed (Figure IV-1).

Existing Public Water Systems

New York City Department of Water Resources serves more than 90 percent of the City's population. It obtains most of its water supply from three upland sources. Groundwater from Long Island and Staten Island as well as natural runoff from the 13 square mile Bronx River drainage provide limited additional supplies. Part of the Queens is served by two small public water companies. They use groundwater aquifer as water sources.



City of New York
CZM Water Supply Study
Figure IV-1

New York City Department of Water Resources

Three upland surface supplies provide the backbone of the system (Figure IV-2).

1. Croton River System

The Croton River System is furnished with the runoff from 375 square miles watershed. The system consists of twelve reservoirs with a total storage capacity of about 95 billion gallons. The new Croton aqueduct can yield approximately 275 mgd of water. The safe yield of the system, computed on the basis of 1960's drought is 248 mgd.

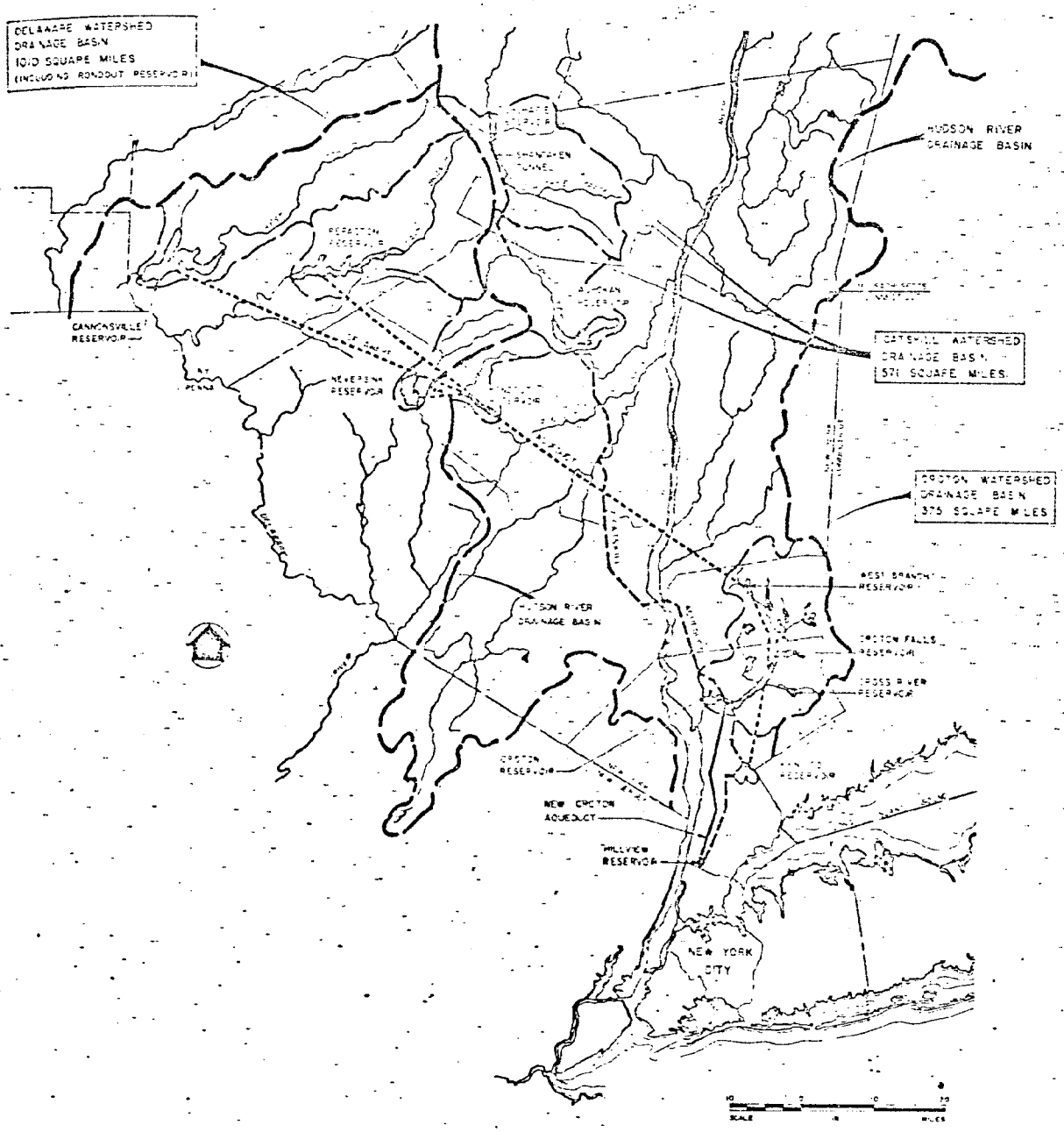
2. Catskill System

The Catskill System gets the runoff from 571 square miles watershed. The total storage of the system in Schoharie and Ashokan reservoirs amounts to 150 billion gallons. The Catskill Aqueduct has a capacity of 600 mgd above Kensico Reservoir, and 800 mgd between Kensico and Hillview. The safe yield, on the basis of 1960's drought flow condition, was estimated as 610 mgd.

3. Delaware System

The Delaware system includes 1,010 square miles of watershed and four reservoirs; Neversink, Pepacton, Cannonsville and Rondout. The total storage of the system amounts to 326 billion gallons. The Delaware Aqueduct is a deep rock tunnel throughout, with a capacity of 890 mgd above West Branch, 1,000 mgd from West Branch to Kensico, and 1,800 mgd from Kensico to Hillview. The safe yield of the system was computed as 610 mgd.

Several local supplies of the City system have very limited capacities and have been used only during water shortages such as the 1960's drought. The local supplies include Ridgewood system which withdraw the groundwater in Queens and Brooklyn, Chelsea pumping station which pumps water from Hudson River.



Existing Surface Water Supplies
New York City
CZM Water Supply Study
Figure IV-2

Investor Owned Water Companies

Two investor-owned water companies, the Jamaica Water Supply Company and the Woodhaven Utilities and Industries Corporation, furnish groundwater to some 650,000 persons in Queens. The present output of the two companies is approximately 60 mgd. The two systems include 85 wells, water treatment facilities, pumping stations, storage reservoirs and distribution mains capable of delivering up to 90 mgd for extended periods. The water from Woodhaven is of such inferior quality that acquisition of the Woodhaven, distribution system by the City and substitution of upstate water was proposed. The well water supplied by the Jamaica Water Supply Company, while less satisfactory than upland sources is of tolerable quality. As the supply of these systems is much limited and its quality poor, they are not included with the safe yield of the City water systems.

Estimations of Future Water Demands and the Potential Water Supply Sources

The future water uses were projected according to future population density, prospective industrial development, growth in per capita water usage and other usages.

The present and future per capita water use may be divided into the non-industrial use and industrial use. The latter includes all domestic, commercial, institutional, and public use plus unaccounted for water in the form of leakage and under-registration of meters.

Table IV-1 summarized the future per capita water use, both non-industrial and industrial, and the total water consumptions from the public water supply system.

Some industries in the Borough of Brooklyn and Queens have their self-supplied water systems. Groundwater is the sole source for these systems.

Table VI-1 Estimated Future Water Consumption from Public Water Supply System

Borough	Present			2000			2020		
	Per Capita non-Industrial (gpd)	Per Capita Industrial (gpd)	Total mgd	Per Capita non-Industrial (gpd)	Per Capita Industrial (gpd)	Total mgd	Per Capita non-Industrial (gpd)	Per Capita Industrial (gpd)	Total mgd
Bronx	109	16	191	124	24	223	129	28	244
Kings	87	24	299	124	35	441	130	38	488
Manhattan	110	80	298	124	118	392	129	135	434
Queens	87	32	233	124	45	375	129	49	424
Richmond	85	39	32	124	30	88	130	25	123
Total			1053			1519			1713

Source: Alternative Regional Water Supply plans by Hazend Sawyer, 1971

Currently, there are 30 industrial users with their own water supply. Total extraction of groundwater by them amounts to about 28 mgd. Of this, 10 mgd or 36 percent is recharged back to groundwater aquifer. The present consumptive use is therefore 18 mgd. This amount is expected to increase, but it is assumed that all additional industrial water requirements in the future will be met by public supplies.

Total safe yield from New York City public water system has been estimated on the basis of the recent drought. It is approximately 1,300 mgd. Compare it with the projected demand, the City water supply will become inadequate by 2000. It should also be noted that the City Water System has to provide water to Westchester County and other secondary service areas. Many previous studies have concentrated their efforts on identifying and analyzing the potential new supply sources for the City's public water systems. Hudson River and several other nearby rivers have been considered to be the major potential supplies. They are located far away from the City boundaries. Thus, not directly related to the coastal zone management program. Some alternative supplies which may have impacts on the coastal zone management program are summarized as follows:

1. Metering - The instituion of universal metering in New York City over the 1930 - 2000 may lead to a saving of an estimated 125 mgd by 2000.

2. Potential New York City - Long Island Water Supply integration. Long Island communities replenish their groundwater reserves during wet years by drawing surplus water from New York's upland system, so as to permit overpumping the wells during prolonged droughts.

Boundary Line Determination

Substantially all of the people in New York City depend upon the public water systems for water supply. Major supply sources are located well beyond

the City limit. Therefore, no particular consideration is needed, from the water supply standpoint in establishing the coastal zone boundary. It is noted that groundwater is used to a limited degree in Queens Borough. The coastal zone boundary lines there should be determined in the same as rest of Long Island.

Areas for Protection

In New York City, three of the five boroughs; Manhattan, Bronx and Richmond are served from City water system which obtain or will obtain its entire supply from upland reservoir. Therefore, the areas inside the coastal zone do not need land use control or other measures to protect their water supplies.

Parts of the Queens and Brooklyn boroughs use groundwater as their sources. So far, the Jamaica Water Supply Company wells have suffered little from salt water intrusion. In order to keep the water quality acceptable, any increase use of groundwater there should be carefully examined.

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