SOUTH CENTRAL CONNECTICUT
WATER SUPPLY MANAGEMENT AREA

FINAL
Integrated Report

PART 3

APRIL 1990

Whitman & Howard, Inc.

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A. BACKGROUND INFORMATION

1. The Coordinated Water System Planning Process

In 1985, the Connecticut General Assembly passed Public Act No. 85-535, "An Act Concerning a Connecticut Plan for Public Water Supply Coordination," codified in Connecticut General Statutes as 25-33c through 24-33, initiating a procedure to coordinate the planning of public water supply systems. The objective of Public Act No. 85-525 is the efficient and effective development of the state's public water supply systems through a coordinated planning approach. Administration of the planning process is the responsibility of the Department of Health Services (DOHS) in consultation with the Departments of Public Utility Control and Environmental Protection, and the Office of Policy and Management. In order to implement the coordinated planning process, a Water Utility Coordinating Committee (WUCC) must be established in each of seven water supply management areas. Each WUCC will be comprised of representatives from area utilities and regional planning organizations. The WUCC in each region is responsible for preparing a required Areawide Supplement as part of the Coordinated Water System Plan. In addition to the Areawide Supplement, the large utilities in each area or utilities required by the DOHS are to prepare individual water systems plans, (large utilities in this context are public water systems serving 1,000 people or more). The South Central Water Supply Management Area WUCC is made up of the members listed in Table 1-1.

2. Major Components of the Coordinated Water System Plan

The major components of the Coordinated Water System Plan are shown on Figure 1-1. Within the Areawide Supplement, which is to be prepared by each WUCC, there are three parts:

- Water Supply Assessment
- Exclusive Service Area Boundaries Report
- Integrated Report

TABLE 1-1
SOUTH CENTRAL WATER SUPPLY MANAGEMENT AREA
WATER UTILITY COORDINATING COMMITTEE MEMBERS

Aaron Manor Convalescent Home, Chester
*Ansonia-Derby Water Company
Beechwood MHP, Killingworth
Bernice's Court, Guilford
Beseck Lane Water Company Middlefield
Bittersweet Ridge, Middlefield
Blue Train Acres, North Branford
Bradley Home, Meriden
*Bridgeport Hydraulic Company
Cedar Grove MHP, Clinton
oCentral Naugatuck Valley COG
oConnecticut River Estuary RPA
*Connecticut Valley Hospital, Middletown
*Connecticut Water Company
Country Manor Health Care Ctr., Prospect
Crestview Condo Assoc., Cheshire
*Cromwell Fire District Water Dept.
*Derby Water Department
Desrocher Apartments, Middlefield
Dogwood Acres, Durham
Durham Center Water Company
Ed's Trailer Park, Bethany
Evergreen Trailer Park, Clinton
Gendron's Valley MHP, Naugatuck
Green Springs Water Co., Madison
Grove School, Madison
Haddam Elderly Housing
Happy Acres, middlefield
Harmony Acres, Middlefield
Hawkstone Terrace Corp, Oxford
Hemlock Apartments, Essex
Henry's Trailer Park, Wallingford
Heritage Cove, Essex
*Heritage Village, Oxford
Highland Heights Water Co., Prospect
Hillview Water Supply, Cheshire
Idleview, MHP, Naugatuck
Krayeske Water Supply, Guilford
Lake Grove at Durham
Lakeside Water Company, Guilford
Leetes Island, Guilford
Legend Hill Condos, Madison
Lorraine Terrace, Middletown
Meadowbrook Rest Home, Essex
*Meriden Water Department
*Metropolitan District Commission
*Middletown Water Department
oMidstate RPA
Mill Pond Elderly Housing, Durham
Mount St. John School, Deep River
New Lakeview Convalescent Home, Cheshire
Nod Hill Apartments, Clinton
Northford Glen Condo, North Branford
Our Lady of Grace Monsatery, Guilford
*Portland Water Department
Quonnipaug Hills Water Supply, Guilford
Ridgewood Hill Condos, Deep River
Rivercrest Water Company, Portland
*South Central CT Regional Water Authority
oSo. Central Regional Council of Governments
*Southington Water Department
Sugarloaf Elderly Housing, Middlefield
Sylvan Ridge Condos, Middlefield
Twin Maples Nursing Home, Guilford
oValley TPA
Walden III Condos, Guilford
*Wallingford Water Division
*Waterbury Water Bureau
West Lake Lodge Nursing Home, Guilford

Public Water Suppliers

*No. serving more than 1000 people	15
No. serving less than 1000 people	49
oRegional Planning Organizations	5
TOTAL MEMBERS	69

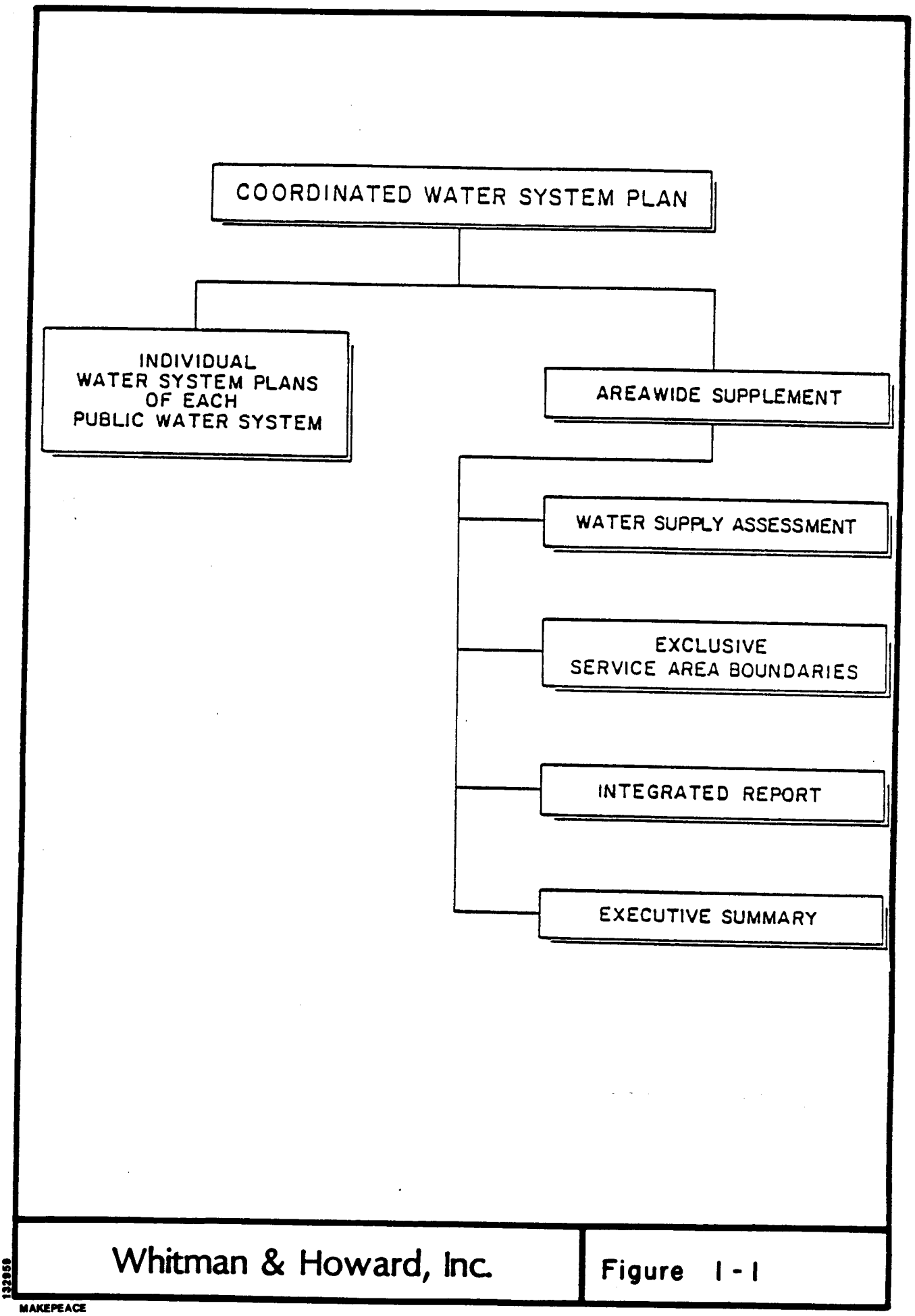

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Figure 1-1

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MAKEPEACE

Each of these parts is described briefly below.

a. Water Supply Assessment

The first component of the Coordinated Plan, the Water Supply Assessment must included:

- o Description of existing water systems
- o Description of future water sources including their availability and adequacy
- o Existing utility service area boundaries
- o Present and projected growth rates
- o Status of water system planning and coordination with local land-use planning
- o Identification of key water supply problems

The purpose of the Assessment is to evaluate water supply conditions and problems within the South Central Public Water Supply Management Area.

b. Exclusive Service Area Boundaries Report

After completion of the Assessment, the WUCC establishes Exclusive Service Area Boundaries for each public water system within the management area. In accordance with the regulations for establishing such boundaries, existing service areas must be maintained. The overall goal of this report is to orderly and efficiently develop public water supplies

c. Integrated Report

The third product of the WUCC is the Integrated Report. This report will provide an overview of individual public water systems within the management area, and addresses areawide supply issues.

At a minimum the Integrated Report must contain the following:

- o Population and Consumption Projections
- o Sources of Supply, Safe Yield, and Amount of Purchased Water Available
- o Identification of Areas not within Exclusive Service Area Boundaries
- o Discussion of Compatibility of Coordinated Plan with Land-Use Planning and Growth Policies

- o Evaluation and Prioritization of Alternative Water Sources
- o Plan for Interconnections
- o Plan for Joint Use, Management or Ownership of System and Facilities
- o Plan for Satellite Management
- o Minimum Design Standards
- o Presentation of Financial Data Pertinent to Areawide Projects
- o Review of Potential Impacts on Other Water Resources Uses

d. Executive Summary

The fourth product of the WUCC is the Executive Summary, which is an abbreviated overview of the Coordinated Water System Plan.

B. DEVELOPMENT OF THE INTEGRATED PLAN

This report is compilation and integration of information received to date, including all information received during the preparation of the South Central Connecticut Water Supply Assessment; more recent city and town legislation affecting water supply; and, most importantly, information provided by Individual Water Supply Plans submitted by those water utilities serving greater than 1,000 people or 250 customers, as required by the State. It must be pointed out, however, that these plans are still in a draft form and have not yet been approved by DOHS. If DOHS does not approve a utility's individual plan as it relates to consumption and safe yield projections, alternative water resources for the future, exclusive service area boundaries, or any other issues addressed in the Areawide Supplement, then the utility must appropriately revise its individual plan to the satisfaction of DOHS - a process which will also influence the content of both the Exclusive Service Areas Report and the Integrated Report.

II. FUTURE PROJECTIONS

A. INTRODUCTION

The objective of this section is to provide an areawide overview of individual water system plans in order to determine potential deficits or surpluses of water for the area as a whole. This section provides a summary of projected service populations, demand, and supplies for the individual utilities and the area as a whole. The projections presented in this section are based on data provided from the individual plans of the water supply utilities. Data not provided by the utilities was obtained from the Final Water Supply Assessment. In the event of inconsistent data, data from the Water Supply Assessment was presumed to be the more recent and thus, the most accurate.

The Assessment identifies 64 utilities within the South Central Public Water Supply Management Area. Fifteen of these utilities serve over 1,000 people, and 49 serve less than 1,000 people. Of the 15 large systems, three utilities - the Metropolitan District Commission (MDC), Southington Water Department, and Waterbury Water Bureau serve small populations within the South Central Area. Approximately 99 percent of the population served by public water supplies in the South Central Area is served by the 12 largest systems.

In addressing the adequacy of existing supplies to meet demand requirements, the large utilities were reviewed to determine the adequacy of water supplies in the area. Because the status of the larger utility's supplies is of greater areawide significance in terms of population affected, a more detailed analysis of future projections for these utilities is provided with the exception of MDC, Waterbury, and Southington. The Waterbury Water Bureau, Southington Water Department, and MDC do not intend to expand their existing service areas within the WUCC boundary. It is anticipated that most of the utilities serving less than 1,000 people will remain relatively stable in terms of population served, projected demand, and available supplies. These utilities overall impact on the areawide totals is considered to be minimal.

B. SUMMARY OF PROJECTED SERVICE POPULATIONS

Table 2-1 provides a summary of the historical and projected total population trends in the South Central Area. These population projections were derived from the Connecticut Office of Policy and Management (OPM) statistics for the area. Table 2-2 provides a summary of the current and projected population serviced by public water utilities.
The small utilities that are not listed in Table 2-2 serve approximately 6,400 people in the South Central Area. These utilities are primarily small systems using bedrock well supplies. This figure is not expected to change substantially over the 50-year planning period.

Table 2-3 provides a reorganization of the available population served data to illustrate the serviced population on a per municipality basis. There are 36 municipalities in the South Central Area.

C. SUMMARY OF PROJECTED DEMAND AND AVAILABLE YIELD IN THE SOUTH CENTRAL AREA

The projections presented in this section are based on the data provided in the individual supply plans and the Final Water Supply Assessment. Consumption and available yield for the individual utilities are presented in Tables 2-4 and 2-5. Table 2-4 summarizes consumption information and available supply for the large utilities; Table 2-5 provides consumption and available supply information for the small utilities.

As noted in the Final Water Supply Assessment and for the purpose of this analysis, demand is essentially equivalent to average production. The individual utilities used various terms for demand in their supply plans; some defined demand as consumption, some as production, and others did not define demand. Average daily demand as presented in the plans is summarized here. In most cases, the data provided were determined using per capita consumption factors. The data reported in this section was derived from the Final Assessment, with available supply consisting of supplies that are currently available and approved for continuous use.

MDC, the Waterbury Water Bureau, and Southington Water Department are not included in Table 2-4 because they serve very few customers in the South Central Area and do not intend to expand their existing service areas within the WUCC.

TABLE 2-1
SOUTH CENTRAL MANAGEMENT AREA
POPULATION PROJECTIONS

Community	U.S. Bureau of Census Population Counts 1970	1980	DOHS Est. 1987[1]	OPM Population Projections[2] 1992	2000	2030
Ansonia	21,160	19,039	18,930	19,265	19,220	19,600
Beacon Falls	3,546	3,995	4,480	4,300	4,400	5,000
Bethany	3,857	4,330	4,620	4,705	4,900	5,800
Branford	20,444	23,363	26,690	24,455	24,940	27,400
Cheshire	19,051	21,788	25,280	25,290	26,790	34,500
Chester	2,982	3,068	3,260	3,600	3,800	5,000
Clinton	10,267	11,195	12,370	12,250	12,740	15,200
Cromwell	7,400	10,265	11,810	11,870	12,770	16,600
Deep River	3,690	3,994	4,260	4,210	4,300	4,800
Derby	12,599	12,346	12,460	12,910	13,110	14,400
Durham	4,489	5,143	5,640	5,960	6,290	8,100
East Haven	25,120	25,028	25,950	25,505	25,730	26,900
Essex	4,911	5,078	5,500	5,340	5,430	6,000
Guilford	12,033	17,375	19,590	19,155	20,730	25,300
Haddam	4,934	6,383	6,820	7,830	8,580	11,900
Hamden	49,357	51,071	51,840	51,745	51,970	53,300
Killingworth	2,435	3,976	4,470	4,730	5,180	7,000
Madison	9,768	14,031	15,360	15,830	17,030	21,400
Meriden	55,959	57,118	59,700	58,070	58,870	61,100
Middlefield	4,132	3,796	3,940	4,270	4,320	5,200
Middletown	36,924	39,040	42,910	42,440	44,540	52,700
Milford	50,858	50,898	52,100	51,900	52,650	55,100
Naugatuck	23,034	26,456	29,410	28,470	29,640	34,500
New Haven	137,707	126,109	127,080	127,110	131,110	138,300
North Branford	10,778	11,554	13,030	12,050	12,700	14,200
North Haven	22,194	22,080	22,530	22,760	23,270	25,000
Old Saybrook	8,468	9,287	10,060	9,665	9,760	10,500

[1,2]See footnotes at the end of this table.

TABLE 2-1 (Cont)
SOUTH CENTRAL MANAGEMENT AREA
POPULATION PROJECTIONS

Community	U.S. Bureau of Census Population Counts 1970	1980	DOHS Est. 1987[1]	OPM Population Projections[2] 1992	2000	2030
Orange	13,524	13,237	13,500	13,740	14,040	15,200
Oxford	4,480	6,634	7,760	7,910	8,540	11,400
Portland	8,812	8,383	8,670	9,260	9,540	11,400
Prospect	6,543	6,807	7,590	6,785	6,630	6,500
Seymour	12,776	13,434	14,120	15,940	17,640	24,000
Wallingford	35,714	37,274	40,580	40,395	41,770	48,700
West Haven	52,851	53,184	54,340	54,480	55,330	58,500
Westbrook	3,820	5,216	5,550	5,700	6,000	7,200
Woodbridge	7,673	7,761	8,240	8,085	8,110	8,700
S. Central Area	714,290	739,736	780,440	777,980	802,370	896,400

[1]Department of Health Services, Division of Health Surveillance and Planning Population Estimated for Counties and Towns as of July 1, 1987.

[2]Office of Policy and Management, Projected Populations, prepared 1986.

TABLE 2-2
SUMMARY OF UTILITY SERVICE PROJECTIONS

Utility Name	Service Area	Population Served				Percent of Total Population Served			
		1987	1992	2000	2030	1987	1992	2000	2030
Ansonia Derby Water Company	Ansonia	18,037	18,482	18,836	19,600	95	96	98	100
	Derby	11,907	12,484	12,848	14,400	96	97	98	100
	Seymour	803	1,045	1,315	1,805	6	7	7	8
	TOTAL	30,747	32,011	32,998	35,805				
Bridgeport Hydraulic Company	Beacon Falls	2,206	2,398	2,640	3,500	49	56	60	70
	Oxford	356	427	598	1,710	5	5	7	15
	Seymour	11,276	12,237	13,936	20,400	80	77	79	85
	TOTAL	13,838	15,062	17,174	25,610				
Connecticut Valley Hospital	Middletown	2,200	2,200	2,200	2,200	-	-	-	-
Connecticut Water Company Chester System	Chester	845	1,073	1,634	3,500	26	31	43	70
	Deep River	1,529	1,758	2,099	3,141	37	42	49	65
	Essex	2,336	2,785	3,475	5,100	44	52	64	85
	TOTAL	4,710	5,615	7,208	11,741				
Connecticut Water Company Guilford System	Clinton	6,058	7,524	8,959	12,643	50	61	70	83
	Guilford	4,708	6,418	9,616	19,024	25	32	46	75
	Madison	7,046	8,688	10,644	15,747	47	55	62	74
	Old Saybrook	8,212	9,462	10,648	12,843	61	73	83	95
	Westbrook	3,837	4,584	5,351	6,667	70	81	89	93
	Durham								
	Haddam				595				5
	Killingworth			518	1,750			10	25
	TOTAL	29,861	36,675	45,735	69,269				

TABLE 2-2 (Cont)
SUMMARY OF UTILITY SERVICE PROJECTIONS

Utility Name	Service Area	Population Served 1987	1992	2000	2030	Percent of Total Population Served 1987	1992	2000	2030
Connecticut Water Company Naugatuck Division	Naugatuck	16,513	18,675	23,712	27,600	58	65	80	80
	Beacon Falls	171	173	308	350	4	4	7	7
	Bethany	90	93	294	1,160	2	2	6	20
	Prospect	210	617	1,326	3,770	3	9	20	58
	Waterbury	1,052	1,053	1,054	1,088	1	1	1	1
	Middlebury	0	0	255	280	0	0	4	4
	TOTAL	18,036	20,610	26,949	34,248				
Cromwell Fire District	Cromwell	9,500	10,865	12,000	16,600	80	92	94	100
Heritage Village Water Company	Oxford	25	123	405	1,749	0.3	1.6	4.7	15.3
Meriden Water Department	Meriden	59,100	58,002	58,811	61,039	98	99	99	100
Middletown Water Department	Middletown	34,300	35,300	37,900	44,800	87	83	85	85
Portland Water Department	Portland	5,860	6,180	6,400	8,100	67	67	68	72

TABLE 2-2 (Cont)
SUMMARY OF UTILITY SERVICE PROJECTIONS

Utility Name	Service Area	Population Served				Percent of Total Population Served			
		1987	1992	2000	2030	1987	1992	2000	2030
South Central Connecticut Regional Water Authority	New Haven	127,080	131,220	134,800	142,200	100	100	100	100
	West Haven	53,000	54,880	54,200	57,700	97	98	98	99
	Milford	52,000	53,300	54,700	57,200	100	100	100	100
	Hamden	49,962	52,460	54,700	57,500	96	97	97	99
	East Haven	25,643	27,400	29,600	31,300	98	99	99	100
	Branford	24,793	25,020	26,300	29,700	93	95	97	100
	Cheshire	19,593	22,320	24,900	35,400	77	80	85	94
	North Haven	20,867	21,720	22,100	24,400	93	93	93	95
	Orange	8,839	9,640	10,700	12,900	65	67	69	78
	North Branford	3,730	4,600	5,400	8,900	28	32	39	57
	Woodbridge	997	1,280	1,800	3,600	12	15	20	38
Bethany		16	16	20	60	3	3	3	9
	TOTAL	386,520	403,856	419,400	461,400				
Wallingford Water Division	Wallingford	27,272	37,415	43,376	54,233	67	74	72	90
	TOTALS	621,969	663,914	710,556	826,794				

TABLE 2-3
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
Ansonia	18,930	2.64	Ansonia Derby Water Co.	18,037	95.0
Beacon Falls	4,480	2.91	BHC Valley Division[4]	2,206	49.2
			CWC[5]	171	4.0
				2,377	53.2
Bethany	4,620	3.04	Ed's Trailer Park	138	3.0
			SCCRWA[6]	16	.3
			CWC[7]	90	1.9
				244	5.2
Branford	26,690	2.50	SCCRWA	24,793	92.9
Cheshire	25,280	2.99	Crestview Condo Association	84	0.3
			Hillview Water Supply	36	0.14
			New Lakeview Conv. Home	270	1.04
			SCCRWA	19,593	77.5
			Southington Water Dept.	200	0.8
				20,183	79.7
Chester	3,260	2.62	Aaron Manor Conv. Home	78	2.3
			CWC-G-C Division, Chester System	845	26.0
				923	28.3

[1-7]See footnotes at the end of this table.

TABLE 2-3 (Cont)
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
Clinton	12,370	2.77	Cedar Grove Mobile Home Park	25	0.2
			CWC Guilford System	6,058	48.9
			Evergreen Trailer Park	103	0.8
			Nod Hill Apartments	30	0.2
				6,216	50.1
Cromwell	11,810	2.52	Cromwell Fire District	9,500	80.4
			Metropolitan District Commission	20	0.1
				9,520	80.5
Deep River	4,260	2.54	CWC Chester System	1,529	35.8
			Mt. Saint John School	144	3.3
			Ridgewood Hill Condos	72	1.6
				1,745	40.7
Derby	12,460	2.58	Ansonia Derby Water Co.	11,081	88.9
			Derby Water Dept.	826	6.6
				11,907	95.5
Durham	5,640	3.16	Dogwood Acres	35	0.6
			Durham Center Water Co.	154	2.7
			Lake Grove at Durham	150	2.6
			Mill Pond Elderly Housing	49	0.8
			Twin Maples Nursing Home	50	0.8
				438	7.8
East Haven	25,950	2.81	SCCRWA	25,643	98.8

[1-7]See footnotes at the end of this table.

TABLE 2-3 (Cont)
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
Essex	5,500	2.36	CWC Chester System	2,336	42.5
			Hemlock Apartments	96	1.7
			Heritage Cove Condos	300	5.4
			Meadowbrook Rest Home	30	0.5
				2,762	50.2
Guilford	19,590	2.93	Bernice's Court	29	0.1
			CWC Guilford System	4,708	24.0
			Krayeske Water Supply	50	0.2
			Lakeside Condos	27	0.1
			Leetes Island	40	2.0
			Our Lady of Grace Monastery	45	0.2
			Quonnipaug Hills Water Supply	456	2.3
			Walden III Condos	143	0.7
			West Lake Lodge Nursing Home	75	0.3
				5,573	28.5
Haddam	6,820	2.92	Haddam Elderly Housing	38	0.5
Hamden	51,840	2.55	SCCRWA	49,962	96.4
Killingworth	4,470	2.77	Beechwood MHP	750	16.77
Madison	15,360	2.95	CWC Guilford System	7,046	45.8
			Green Springs Subdivision	105	0.6
			Grove School	94	0.6
			Legend Hill Condos	270	1.7
				7,515	48.9

[1-7]See footnotes at the end of this table.

TABLE 2-3 (Cont)
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
Meriden	59,700	2.60	Bradley Home	151	0.2
			Meriden Water Dept.	59,000	98.8
				59,151	99.0
Middlefield	3,940	2.74	Beseck Lake Water Co.	276	7.0
			Bittersweet Ridge	40	1.0
			Descrocher Apts.	25	0.6
			Happy Acres	130	3.0
			Sugarloaf Elderly Housing	40	1.0
			Sylvan Ridge Condos	84	2.0
				595	15.0
Middletown	42,910	2.48	Conn. Valley Hospital	2,200	5.1
			Lorraine Terrace	20	0.0
			Middletown Water Dept.	34,300	79.9
				36,520	85.0
Milford	52,100	2.80	SCCRWA	52,000	99.8
Naugatuck	29,410	2.73	CWC Naugatuck Division	16,513	56.1
			Gendrons Valley Mobile Home Park	129	0.4
			Idleview Mobile Home Park	174	0.5
				16,816	57.0
New Haven	127,080	2.41	SCCRWA	127,080	100.0

[1-7]See footnotes at the end of this table.

TABLE 2-3 (Cont)
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
North Branford	13,030	3.17	Blue Trail Acres	216	1.6
			Northford Glen Condos	84	0.6
			SCCRWA	3,730	28.6
				4,030	30.8
North Haven	22,530	2.95	SCCRWA	20,867	92.6
Old Saybrook	10,060	2.68	CWC Guilford System	8,212	81.6
Orange	13,500	3.07	SCCRWA	8,839	65.5
Oxford	7,760	3.11	BHC Valley Division	356	4.6
			Hawkstone Terrace	56	0.7
			Heritage Village Water Co.	31	0.4
				443	5.7
Portland	8,670	2.79	Portland Water Dept.	5,860	67.6
			Rivercrest Water Co.	72	0.8
				5,932	68.4
Prospect	7,590	3.16	Country Manor Health Facility	150	1.9
			CWC Naugatuck Division	210	2.7
			Harmony Acres Mobile Home Park	350	4.6
			Highland Heights Water Co.	122	1.6
				832	10.8

[1-7]See footnotes at the end of this table.

TABLE 2-3 (Cont)
SOUTH CENTRAL WATER SUPPLY
MANAGEMENT AREA
MUNICIPALITY SUMMARY

Community	1987 Total Population[1]	Average Size of Household[2]	Public Utilities	1987 Population Served[3]	1987 Percent Population Served
Seymour	14,120	2.66	Ansonia Derby Water Co.	803	5.7
			BHC Valley Division	11,276	79.8
				12,079	85.5
Wallingford	40,580	2.77	Wallingford Water Division	27.107	66.8
			Henry's Trailer Park	65	0.1
			Meriden Water Dept.	100	0.2
				27,272	67.1
Westbrook	5,550	2.50	CWC Guilford System	3,837	69.1
West Haven	54,340	2.51	SCCRWA	53,000	97.5
Woodbridge	8,240	2.99	SCCRWA	997	12.1
TOTAL	780,440			627,128	80.35

Sources of Information:

[1]Department of Health Services, Division of Health Surveillance and Planning Population Estimates for Counties and Towns, 1987
[2]Department of Health Services, Division of Health Policy, Planning and Statistics 1986 Persons Per Household
[3]Individual Water Utility Supplied Information
[4]BHC - Bridgeport Hydraulic Company
[5]CWC - Connecticut Water Company
[6]SCCRWA - South Central Connecticut Regional Water Authority
[7]CWC - Supplies 90 people in Bethany with fire protection.

TABLE 2-4
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR THE LARGE UTILITIES[1]

Utility Name	Community(s) Served	Average Daily Demand (mgd)[2] 1987	1992	2000	2030	Available Supply (mgd)[3] 1987	1992	2000	2030
Ansonia Derby Water Co.	Ansonia Derby Seymour	4.06	3.77	3.75	4.06	6.45	6.45	6.45	6.45
Bridgeport Hydraulic Company	Beacon Falls Oxford Seymour	1.65	1.69	1.76	2.86	4.9	4.9	4.9	4.9
Connecticut Valley Hospital	Middletown	.165	.165	.165	.165	.704	.704	.704	.704
Connecticut Water Company Chester System	Chester Deep River Essex	.589	.677	.812	1.18	1.6	1.6	1.7	1.7
Connecticut Water Company Guilford System	Clinton Guilford Madison Old Saybrook Westbrook Durham Haddam Killingworth	3.58	4.37	5.41	8.0	6.37	9.0	10.9	18.85
Connecticut Water Company Naugatuck System	Naugatuck Beacon Falls Bethany Prospect Waterbury Middlebury	3.19	3.73	4.75	5.7	4.06	5.57	6.93	8.68

[1,2,3]See footnotes at the end of this table.

TABLE 2-4 (Cont)
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR THE LARGE UTILITIES[1]

Utility Name	Community(s) Served	Average Daily Demand (mgd)[2] 1987	1992	2000	2030	Available Supply (mgd)[3] 1987	1992	2000	2030
Cromwell Fire District	Cromwell	1.5	2.23	2.75	4.37	3.96	4.36	5.43	8.84
Heritage Village[4] Water Company	Oxford Southbury Middlebury	.82	.925	1.05	1.53	1.3	1.3	1.3	1.3
Meriden Water Department	Meriden	6.8	7.7	8.7	9.8	9.6	9.6	9.6	12.2
Middletown Water Department	Middletown	4.55	6.04	7.0	11.1	9.35	9.35	9.35	21.2
Portland Water Department	Portland	.708	.871	.902	1.142	1.5	2.5	2.5	3.4
South Central Connecticut Regional Water Authority	New Haven West Haven Milford Hamden East Haven Branford Cheshire North Haven Orange North Branford Woodbridge Bethany	56.77	62.4	66.3	73.7	78.0	83.9	94.7	94.7

1,2,3,4See footnotes at the end of this table.

TABLE 2-4 (Cont)
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR THE LARGE UTILITIES[1]

Utility Name	Community(s) Served	Average Daily Demand (mgd)[2] 1987	1992	2000	2030	Available Supply (mgd)[3] 1987	1992	2000	2030
Wallingford Water Division	Wallingford	6.02	6.91	7.5	9.11	8.2	8.97	8.97	12.0
TOTAL		90.40	101.47	110.8	132.71	135.99	147.40	163.43	194.77
TOTAL LESS HERITAGE VILLAGE WATER CO.		89.58	100.55	109.80	131.18	134.69	146.10	162.13	193.47

[1]Available supply consists of only active supplies and not emergency or inactive sources.

[2]mgd - Million Gallons Per Day

[3]Available supply is comprised of sources of supply that are in continuous use, exclusive of supplies that require additional treatment or supplemental pumping capacity, etc.

[4]Heritage Village Water Company currently serves approximately 25 people in the South Central Area. System totals are provided in this table.

TABLE 2-5
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR SMALL UTILITIES

Utility Name	Location	Average Daily Demand (gpd)[1] 1987	1992	2000	2030	Available Supply (gpd) 1987
Aaron Manor Home		5,850	5,850	5,850	5,850	
Beechwood MHP		45,000	45,000	45,000	45,000	
Bernice's Court		2,175	2,175	2,175	2,175	
Beseck Lake Water Company		7,000	7,000	7,000	7,000	
Bittersweet Ridge		3,000	3,000	3,000	3,000	
Blue Trails Assoc.		16,200	16,200	16,200	16,200	
Bradley Home		7,350	7,350	7,350	7,350	
Cedar Grove MHP		1,875	1,875	1,875	1,875	
Country Manor		15,750	15,750	15,750	15,750	
Crestview Condos		6,300	6,300	6,300	6,300	
Descrocher Apartments		1,875	1,875	1,875	1,875	
Dogwood Acres		2,265	2,265	2,265	2,265	
Durham Center Water Co.		16,000	16,000	16,000	16,000	

[redacted]

[1]Gallons per day

TABLE 2-5 (Cont)
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR SMALL UTILITIES

Utility Name	Location	Average Daily Demand (gpd)[1] 1987	1992	2000	2030	Available Supply (gpd) 1987
Ed's Trailer Park		10,350	10,350	10,350	13,350	[redacted]
Evergreen Trailer Park		19,125	19,125	19,125	19,125	
Gendron's Valley MHP		14,625	14,625	14,625	6,579	
Green Springs Subd.		6,000	6,270	6,270	6,270	
Grove School		5,310	5,310	5,310	5,310	
Haddam Elderly Housing		2,850	2,850	2,850	2,850	
Happy Acres		9,570	9,750	9,750	9,750	
Harmony Acres MHP		29,475	29,475	29,475	29,475	
Hawkstone Terrace Corp.		4,200	4,200	4,200	4,200	
Hemlock Apartments		7,200	7,200	7,200	7,200	
Henry's Trailer Park		4,875	4,875	4,875	4,875	
Heritage Cove Condos		12,395	12,400	12,400	12,900	
Highland Heights Water Company		7,500	7,500	7,500	7,500	

[1]Gallons per day

TABLE 2-5 (Cont)
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR SMALL UTILITIES

Utility Name	Location	Average Daily Demand (gpd)[1] 1987	1992	2000	2030	Available Supply (gpd) 1987
Hillview Water Supply		3,600	3,600	3,600	3,600	
Idleview MHP		6,300	6,300	6,300	6,300	
Krayeske Water Supply		3,750	3,750	3,750	3,750	
Lake Grove at Durham		27,397	27,397	27,397	27,397	
Lakeside Water Company		2,025	2,025	2,025	2,025	
Leetes Island		3,000	3,000	3,000	3,000	
Legend Hill Condos		16,200	16,200	16,200	16,200	
Lorraine Terrace		1,500	1,500	1,500	1,500	
Meadowbrook Rest Home		2,250	2,250	2,250	2,250	
Mill Pond Elderly Housing		3,675	3,675	3,675	3,675	
Mount St. John School		4,680	4,680	4,680	4,680	
New Lakeview Conv. Home		20,250	20,250	20,250	20,250	
Nod Hill Apartments		2,030	2,030	2,030	2,030	

[redacted]

[1]Gallons per day

TABLE 2-5 (Cont)
AVERAGE DAILY DEMAND AND AVAILABLE SUPPLY FOR SMALL UTILITIES

Utility Name	Location	Average Daily Demand (gpd)[1] 1987	1992	2000	2030	Available Supply (gpd) 1987
Northford Glen Condos		6,300	6,300	6,300	6,300	
Our Lady of Grace Mon		3,375	3,375	3,375	3,375	
Quonnipaug Park Water Supply		34,200	34,200	34,200	34,200	
Ridgewood Hill Condos		5,400	5,400	5,400	5,400	
Rivercrest Water Company		5,400	5,400	5,400	5,400	
Sugarloaf Elderly Housing		3,000	3,000	3,000	3,000	
Sylvan Ridge Condos		6,300	6,300	6,300	6,300	
Twin Maples Nursing Home		4,050	4,050	4,050	4,050	
Walden III Condos		10,725	10,725	10,725	10,725	
West Lake Lodge Nurs.		4,800	4,800	4,800	4,800	

[1]Gallons per day

D. FACTORS AFFECTING SUPPLY AND DEMAND PROJECTIONS

As noted in the Final Assessment, the projected demand figures were frequently based on Office of Policy and Management population projections. Some of these OPM projections have already been exceeded by the current populations. Projections are estimates of future possibilities based on current trends. These trends can be influenced by actions that are often not predictable. Similarly, demand figures can also be influenced by unpredictable factors such as the installation of metering programs, the implementation of volunteer or mandatory conservation programs, or rapidly escalating water rates or sewer discharge fees.

The projected availability of future supplies and the feasibility of their actual development was not generally discussed in the individual supply plans. The quality of the source at the desired time of use, and the economics of developing the supply are variables that are not predictable but will influence the consideration of future supplies. Similarly, supply availability can be impacted by the regulatory permitting process, competing water resource uses, costs of development including treatments and transmissions incompatible land use, and water quality.

E. WATER SUPPLY CONDITIONS

The sources of supply in the South Central Area include both groundwater supply wells and surface water reservoirs. Groundwater sources supply nearly all of the utilities serving less that 1,000 people, whereas approximately 65 to 70 percent of the population served by public water supplies are using surface water sources. The South Central Connecticut Regional Water Authority is the largest utility in the area and approximately 85 percent of its total capacity comes from surface supplies.

1. PURCHASED WATER

As described in the Interconnection Section of the Integrated Report, there are four major interconnections used for continuous supply purposes within the South Central Area.

- SCCRWA -

- SCCRWA -

utilities) in the South Central Area are dependent on this type of groundwater supply. As noted in the DOHS guidelines for the preparation of individual supply plans, utilities are required to determine the available yield of these supplies in accordance with the methodology to be incorporated into DOHS regulations. Because this methodology has not yet been finalized, utilities used their own methods for deriving the available yield of their gravel-packed wells. This information was used in the Assessment and in this section. It is anticipated that when the regulation is adopted, adjustments to the current safe yield data will be required.

The majority of the systems in the South Central Area serve less than 1,000 people, and rely on bedrock wells. As described previously, their available yields are calculated based on pumping capacity over an 18-hour pumping day. Although Tables 2-4 and 2-5 show supply availability in excess of projected demand, it should be noted that many of their systems are already experiencing difficulty in meeting peak demand levels due to system limitations, inadequate treatment capacity, or other constraints. It is the opinion of the WUCC that this apparent surplus of supply should not be considered as such. It is presumed, instead, that all small utilities which are shown to have excess supply capabilities be considered only self-sufficient through the planning period. The excess capacity should not be viewed as "available" to ease any areawide or large system supply inadequacies. This decision is based not only on accuracy problems associated with small system yield estimates, but also reflects the practical difficulties associated with incorporating numerous scattered small sources (many of which may require upgrading), into a larger supply network. The incremental costs of developing transmission lines to transport these small quantities of scattered groundwater supplies far exceed the measurable costs of new supply development.

3. Future Water Supply Needs

Projections for future water supply needs for the large water systems have been developed from the data identified in the previous subsections. The projected water supply surplus or deficit for each water system was tentatively computed by comparing average daily demand projections with the estimated yields for present and future surface and groundwater supplies as well as water that is purchased or sold to

TABLE 2-6
PROJECTED WATER SUPPLY SURPLUS OR DEFICIT
FOR EACH LARGE UTILITY BASED ON EXISTING AVAILABLE SUPPLIES

Utility Name	Community(s) Served	Projected Surplus or Deficit (mgd) 1987	1992	2000	2030
Ansonia Derby Water Company	Ansonia Derby Seymour	2.39	2.68	2.7	2.39
Bridgeport Hydraulic Company	Beacon Falls Oxford Seymour	3.25	3.21	3.14	2.04
Connecticut Valley Hospital	Middletown	.54	.54	.54	.54
Connecticut Water Company Chester System	Chester Deep River Essex	1.01	.92	.79	.42
Connecticut Water Company Guilford System	Clinton Guilford Madison Old Saybrook Westbrook Durham Haddam Killing Worth	2.79	2.0	.96	-1.63
Connecticut Water Company Naugatuck Division	Naugatuck Beacon Falls Bethany Prospect Waterbury Middlebury	.87	.33	-.69	-1.64
Cromwell Fire District	Cromwell	2.46	1.73	1.21	-0.41
Heritage Village Water Company	Oxford Southbury Middlebury	.48	.375	.25	-0.23
Meriden Water Department	Meriden	2.8	1.9	.9	-0.2
Middletown Water Department	Middletown	4.8	3.31	2.35	-1.75

TABLE 2-6 (Cont)
PROJECTED WATER SUPPLY SURPLUS OR DEFICIT
FOR EACH LARGE UTILITY BASED ON EXISTING AVAILABLE SUPPLIES

Utility Name	Community(s) Served	Projected Surplus or Deficit (mgd) 1987	1992	2000	2030
Portland Water Department	Portland	.79	.63	.60	.36
South Central Connecticut Regional Water Authority	New Haven West Haven Milford Hamden East Haven Branford Cheshire North Haven Orange North Branford Woodbridge Bethany	21.23	15.60	11.70	4.3
Wallingford Water Division	Wallingford	2.18	1.29	0.7	-0.91

III. ALTERNATIVE WATER RESOURCES FOR FUTURE SUPPLY NEEDS

A. AVAILABLE RESOURCES

The members of the South Central WUCC have made projections of future demand and supply needs. As a part of these projections, they have identified future alternative water supply sources to help meet the increasing demands. This section will review these alternatives, discuss future supply concerns of individual suppliers and areawide concerns of the WUCC, and discuss water conservation and the efforts of major utilities to expand and implement conservation efforts.

Projected supply surplus or deficits have been discussed in other sections of this report. Table 2-6, Projected Water Supply Surplus or Deficit for Each Large Utility Based on Existing Available Supplies, demonstrated that without supply expansions through development of new sources of supply, many large utilities will be faced with deficits by the end of the planning period, in the year 2030. These utilities include the Connecticut Water Company (both the Guilford and Naugatuck Systems), Cromwell Fire District, Heritage Village Water Company, Meriden Water Bureau, Middletown Water Department, and the Wallingford Water Division.

Table 3-1 provides a "Summary of Potential Future Surface Water Sources" that have been identified by the large utilities within their individual water supply plans. Similarly, Table 3-2 provides a "Summary of Potential Future Groundwater Sources." These tables contain all alternative resources that the companies have identified. Not all of these options are currently being considered for development by the year 2030.

The potential yield values presented within these tables are estimated safe yields for the individual projects. However, these figures often refer to projects planned to be developed quite far into the future. As the individual projects are approaching completion, or soon after they are placed into service, more accurate estimates of safe yield should be determined and applied to subsequent planning exercises.

In most cases, future demand projections were considered to be average daily demands. Therefore, system supply potentials, when compared with demand, may tend to be optimistic where peak demands were not utilized in future demand trends. Although not required for this planning effort, state agencies also encourage utilities to maintain excess supply capacity

TABLE 3-1
SUMMARY OF POTENTIAL FUTURE SURFACE WATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
Ansonia Derby	Ansonia Seymour	- Reactivate Beaver Brook Reservoir System	2.40	- Filtration plant needed - Option for distant future	AA
	Bethany	- Dam on the Hopp Brook Watershed	0.40	- ADWCo currently owns 53% watershed - Option for distant future	AA
Connecticut Water Co. (Naugatuck System)	Bethany	- Beacon Valley Brook Diversion	0.45	- Convert emergency supply to active supply - Pump water to new Naugatuck Treatment Plant - More permanent diversion structure required	AA
	Naugatuck	- New Reservoir on Meshaddock Brook	0.86	- Impound 150 mg over 29 acres - Treatment plant necessary - May be affected by EPA rulings	AA
	Naugatuck Middlebury	- Dam on Hop Brook or Diversion to Meshaddock	1.75	- Impound 300 mg over 154 acres - Extensive land acquisition necessary - Treatment plant necessary	AA

*mgd = million gallons per day

TABLE 3-1 (Cont)
SUMMARY OF POTENTIAL FUTURE SURFACE WATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
	Prospect	- Prospect Diversion to Moody Reservoir	0.55	- Diversion area of 9 square mile area - Land acquisition necessary - Considered an unattractive option due to area development and land acquisition problems	AA
	Naugatuck			ency	AA
Connecticut Water Co. (Guilford System)	Killingworth	-			AA
	E. Haddam	- Connecticut River	5.0	- Class B water not currently available for water supply - Treatment required - Large investment necessary. Perhaps appropriate for joint venture operations.	B

*mgd = million gallons per day

TABLE 3-1 (Cont)
SUMMARY OF POTENTIAL FUTURE SURFACE WATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
Meriden Water Bureau	Berlin	[redacted]	[redacted]		AA
	Cheshire	[redacted]	[redacted]		AA
	Meriden Berlin	[redacted]	[redacted]		AA
	Cheshire	- Increase Purchases from SCCRWA	0.5	- Subject to Quinnipiac River Flow Management Plan	
Middletown Water Dept.	Middletown Middlefield	[redacted]	[redacted]		
S. Central CT Regional Water Authority	W. Haven Orange	[redacted]	[redacted]		AA

*mgd = million gallons per day

TABLE 3-1 (Cont)
SUMMARY OF POTENTIAL FUTURE SURFACE WATER SOURCES

Utility	Towns in which Source is Located		Safe Yield		Class
	Hamden	[redacted]	[redacted]	[redacted]	AA
	Killingworth	- E. Branch Hammonasset River Diversion	4.5	- Take advantage of unused storage capacity in Lake Hammonasset - Potential conflict with downstream well sites	AA
	Guilford	- Diversion into Lake Menunkatuck	0.2	- May reduce flow into Quonnipaug Lake	A
	Madison	- Cedar Swamp Diversion	0.7	- May affect White Cedar Swamp wetlands	A
	Madison	- Page Lot Brook & Lower Iron Works Stream Diversions	0.5		AA
	Madison	- N. Madison Diversion	0.8		AA

*mgd = million gallons per day

TABLE 3-1 (Cont)
SUMMARY OF POTENTIAL FUTURE SURFACE WATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
	Prospect	-		[redacted]active	A
	Orange	-		[redacted]reservos	A
	Unspecified	- Connecticut River Diversion		- Not allowable at this time	B
	Unspecified	- Housatonic River Diversion		- Not allowable at this time	C
	E. Haddam	- Salmon River Diversion		- This river not currently utilized for water supply	A
Wallingford Water Division	Wallingford	- Tyler Mill Reservoir or Diversion	2.6	- May be affected by EPA rulings	A
		- Farm River Diversion	2.2	- Land acquisition necessary - Additional diversion may not be necessary	

*mgd = million gallons per day

TABLE 3-2
SUMMARY OF POTENTIAL FUTURE GROUNDWATER SOURCES

Utility	Towns in which Source is Located	Safe Yield	Comments	Class
Ansonia Derby	Seymour		Diversion permit received from DEP Ansonia Derby owns land	GAA
Connecticut Water Co. (Naugatuck System)	Naugatuck Prospect		Land acquisition necessary Treatment facilities necessary	GA
	Naugatuck		Land acquisition necessary Treatment facilities necessary	GA
Connecticut Water Co. (Guilford System)	Guilford		Minimum of 4 additional acres of land to be acquired Treatment for iron and manganese necessary	GAA
	Clinton		CWC owns sufficient land Treatment for iron and manganese necessary	GAA
	Old Saybrook		Piping across a swamp necessary to connect well to existing system	GAA
	Westbrook		Expand treatment facilities for iron removal Treatment plant needs modification for cold weather operation	GAA

*mgd = million gallons per day

TABLE 3-2 (Cont)
SUMMARY OF POTENTIAL FUTURE GROUNDWATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
	Guilford			Iron and manganese treatment required for well to be used continuously CWC currently plans use of this well only for emergency	GAA
	Killingworth			CWC owns adequate land for well and treatment facilities	GAA
	Killingworth			CWC owns adequate land for well and treatment facilities Tests indicate good water quality	GAA
	Killingworth			CWC owns adequate land to develop well site	GAA
	Madison			Iron and manganese treatment anticipated, to be provided by Rettich Well Field facility CWC owns adequate land to develop well	GAA
	Westbrook			Iron and manganese treatment anticipated	GAA

*mgd = million gallons per day

TABLE 3-2 (Cont)
SUMMARY OF POTENTIAL FUTURE GROUNDWATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
	Unspecified	- Bedrock Well Sites	NA	- Fracture trace analysis used to identify potential well sites - Not currently considered attractive option, costly, low chance of success	
Cromwell Fire District	Cromwell			- Well No. 3 constructed around 1995 - Well No. 4 constructed prior to 2020 - Increase existing pump size 1989	GAA
Heritage Village Water Co.	Southbury			- 1 well planned for late 1980's - 2 wells needed prior to 2030 - Sites contingent upon development patterns	GAA
Meriden Water Bureau	Berlin	- Explore for Bedrock Wells	NA	- Generally lower yield, higher cost, and low chance for success	
	Meriden			- Subject to Quinnipiac River Flow Management Plan	GAA

*mgd = million gallons per day

TABLE 3-2 (Cont)
SUMMARY OF POTENTIAL FUTURE GROUNDWATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
Middletown Water Dept.	Middletown	[redacted]	[redacted]	[redacted]	GAA
	Middletown	- Develop Canel Aquifer	4.0	- Develop around year 2010 - New treatment plant or [redacted]	GAA
Portland Water Works	Portland	- Connecticut River Aquifer	2.2	- Expected to be a 7-well field - Tests indicate good quality water - Acreage acquisition necessary - Treatment for iron and manganese most likely necessary	GAA
S. Central CT Regional Water Authority	Cheshire	[redacted]	[redacted]	- SCCRWA owns significant acreage to develop - Potential land-use conflicts - DEP concern over withdrawals effect on downstream Quinnipiac River flows and wetlands - Subject to Quinnipiac River Flow Management Plan	GAA

*mgd = million gallons per day

TABLE 3-2 (Cont)
SUMMARY OF POTENTIAL FUTURE GROUNDWATER SOURCES

Utility	Towns in which Source is Located	Source	Safe Yield (mgd)*	Comments	Class
	N. Branford	- Farm River Well Field Site	1.8	- Local land use primarily residential/agricultural - To be considered when service area extends further north	GA
	Hamden	- Waite Street Well Field by the Mill River	1.5	- Hydrogeologic evaluation in progress to determine effects, if any, of possible contaminated site 2000 ft up gradient - Potential land-use conflicts	
	[redacted]	[redacted]	[redacted]	[redacted]	GAA
	[redacted]	[redacted]	[redacted]	[redacted]	GAA
	[redacted]	[redacted]	[redacted]	[redacted]	GAA
	N. Branford	- Muddy River Well Field	1.5	- Possible industrial zoning area of contribution	GA
Wallingford Water Division	Durham	- Durham Area Aquifer Potential	NA	- To be assessed	
	Wallingford	- Muddy River Aquifer	2.0	- 1980 estimate of yield, needs to be reassessed - Land acquisition necessary	

*mgd = million gallons per day

for a margin of safety for periods when the system may experience abnormal stress. An example of such a margin of safety may be 15 percent of expected demand.

B. FUTURE SUPPLY ALTERNATIVES

As mentioned previously, individual utilities frequently identified more alternatives for additional sources of supply than are currently being considered for development by the end of the planning period in the year 2030. Table 3-3 identifies those water supply sources that are specifically proposed to meet future demands during the planning period. Where utilities anticipate increases in supply as a result of the construction of new, or modifications in existing, treatment facilities, these projects are also included within this table. This table also identifies anticipated additional supply resulting from each project and the expected schedule for development of these supply options.

Sources of supply were identified in addition to those which are planned for development by the year 2030. This recognizes that additional supplies may be necessary after that date and that future potential sites must be identified and protected now. Also, some supply options may prove unfeasible making consideration and development of more long range source options necessary. The philosophy of the South Central WUCC is to, where possible, develop local sources of supply first, then expand into more regional programs as local alternatives are exhausted. Some reasons for options being dropped from current consideration include water quality issues, environmental concerns, extensive competition for water resources within stressed basins of concern, source distance from the service area, and economic consideration, i.e., high cost of development compared with expected yield.

C. SUPPLY ISSUES AND POSSIBLE CONFLICTS

In identifying alternatives for future water supply, necessary steps for the development of the resource and potential constraints and/or conflicts should be identified by the various utilities. Types of issues include water quality and treatment concerns, potential impacts on other resources, multiple-use conflicts, and aquifer and watershed protection.

TABLE 3-3
SOUTH CENTRAL PUBLIC WATER MANAGEMENT AREA
FUTURE WATER SUPPLY SOURCES
PROPOSED IN INDIVIDUAL DRAFT PLANS

Water Utility	Source	Additional Supply to System 1992	2000	2030
Connecticut Water Company	Beacon Valley Brook Diversion	.45	-	-
	[redacted]	.05	-	-
		3.30	-	-
		.50	-	-
		-	.50	-
		-	.50	-
		-	2.00	-
		-	.50	-
Cromwell Fire District	[redacted]	.94	-	-
		-	2.88	-
		-	-	NA
Heritage Village	[redacted]	NA	-	-
		-	-	NA
Meriden Water Bureau	[redacted]	0.31		
		0.30	-	-
		0.07	-	-
		NA	-	-
	Interconnect with the SCCRWA	1.50	-	-
Middletown Water Department	[redacted]	1.50	1.50	-
		-	-	4.00
		0.75		
Portland Water Works	Develop Strongs Avenue/Bell Court Aquifer w/ Treatment Plan	-	2.20	-
SCCRWA	[redacted]	-	6.50	-
		1.80	-	-
Wallingford Water Division	Durham Area Diversion	-	-	NA
	Develop Muddy River Aquifer	-	2.00	-
	[redacted]	-	-	2.60
	SCCRWA Interconnection	-	.50	-
	[redacted]	.92	-	-

NOTE: NA = Addition to supply estimate not available.

Potential impacts on other resources would include, but are not limited to, other uses of the resource. The development of a surface water source or expansion of an existing supply could have positive implications on the recharge characteristics of underlying groundwater aquifer systems. Impoundments could benefit stream systems by augmenting low flows for fisheries and recreational uses. However, these same surface source activities may result in negative impacts to the downstream areas. In terms of newly developed groundwater sources, water withdrawal could affect surrounding wells, nearby stream flows, and adjacent wetlands.

The goals of the WUCC members are to establish and ensure future water supplies in the most cost-effective manner possible, and to anticipate and mitigate any potential negative effects of the increased water supply development. By following this plan, the WUCC believes these goals would be achieved.

The future supply needs, issues, and potential problems as identified by the utilities in their individual water supply plans are summarized in the following discussions.

Ansonia Derby Water Company

There are several factors which limit the growth in future demand and subsequently, the need for future alternative sources of supply. Some of these factors include:

- The Towns of Ansonia and Derby are both heavily developed, resulting in limited future growth rates.
- Although growth in Seymour is expected to rise, the effect on Ansonia Derby Water Company is anticipated to be minimal because the company serves only a small portion of the Town.
- The Water Company expects that some portion of future demand increases will be met through water conservation efforts and planned system improvements.
- Ansonia Derby Water Company's industrial water consumption has demonstrated a declining trend. Industrial water consumption is not expected to increase during the 50-year planning period.

In recognition of the cumulative effect of the above listed factors, the Ansonia Derby Water Company does not plan to develop alternative water supply sources during the planning period. However, the following three alternative sources have been identified in their water supply plan:

[redacted]

One of these alternatives previously identified is building a dam and creating a new reservoir on Hopp Brook. A site evaluation was conducted by the Interagency Water Resources Planning Board (IWRPB). The Water Company owns much of the land at this site and within the watershed, therefore, land use is restricted to protect this source. The IWRPB recommends that this site be retained for potential future expansion. Problems may still arise in attempting to create a new surface impoundment. As will be discussed in more detail later, recent EPA decisions regarding new and expanded impoundments and their relationships with surrounding wetland resources are making it increasingly difficult to obtain necessary permits and approvals for projects like this one.

Bridgeport Hydraulic Company

The only portion of the Bridgeport Hydraulic Company System that falls within the South Central Public Water Supply Management Area is the Valley Division serving the communities of Beacon Falls, Oxford, and Seymour.

[redacted]

quality standards set by the Safe Drinking Water Act (SDWA). BHC has a 30-year contract providing for purchases of up [redacted] through this interconnection. At the end of the 30-year period, the contract provides for two 10-year contract extensions of this interconnection subject to the agreement of both SCCRWA and BHC.

A comparison of the expected supply from current sources with projected future demands indicates that the sources presently on-line are more than adequate to meet the future requirements of the Valley Division. This is demonstrated below:

The Connecticut Water Company has also identified the damming of Hop Brook and creating a new reservoir, or diverting flow from Hop Brook to the proposed Meshaddock Reservoir as an additional future source. In addition to the problems potentially raised by the EPA, Connecticut Water Company currently owns none of the required land necessary for this project. The company has also identified the need for a water treatment facility at this site.

An option to divert water from a 0.9 square mile area in Prospect to the Moody Reservoir watershed was recognized in 1944. However, this potential source is not considered currently feasible because of considerable residential development in the area.

The Connecticut Water Company is pursuing three potential groundwater sites. Tw[redacted] projects will require at least 2 years for development and efforts would include land acquisition, drilling, structures, transmission mains, and simple chemical treatment.

Connecticut Water Company, Guilford System

[redacted]

acquiring the necessary permits. However, again, the EPA position regarding reservoir construction or expansion may delay and make this project much more difficult than anticipated. The Connecticut Water Company has also consumated an acreage swap with the Town of Killingworth to construct a new Town road which will replace an existing one which may [redacted] is now in service.

Several groundwater well projects have been identified and in some cases, tested to indicate significant potential.

- An additional well in the sand-and-gravel aquifer from which the Guilford Well currently produces water is under consideration. Additional acreage would be needed to protect the well head radius, and iron and manganese treatment facilities would be required.
- High production wells are cont[redacted]he company currently owns sufficient land for the well sites and

treatment facilities for iron and manganese removal. This treatment facility could serve other wells in the Hammonasset River Valley.

[redacted]

The Connecticut Water Company includes the Connecticut River as a potential future source of supply. This river is currently designated as a Class B water resource since it receives treated wastewater effluents from Connecticut and other upstream states. Although state law prohibits the use of Class B resources for water supply, their consideration is permitted in this planning process. The company also recognizes the considerable investment necessary for water treatment and transmission mains to take the w[redacted]. They propose that this type of project m[redacted] venture with other water utilities or municipalities. However, such a proposal would not be considered by the WUCC until it could be ascertained that, at some time during the 50-year planning period, this is a need and that no other feasible or viable alternative will be available to meet this need.

Connecticut Water Company, Chester System

[redacted] discussed above is also a potential future source [redacted]

Cromwell Fire District

By the year 2030, the Cromwell Fire District expects the maximum daily demand to increase by 6.21 mgd. However, the company also expects that the untapped potential of t[redacted] ient to meet

this demand.
array pumping

No other problems or constraints were reported in the individual water supply plan for the wells required to meet demand expectations.

Heritage Village Water Company

Water consumption projections for the Heritage Village Water Company indicate the following expected daily demands:

Year	Demand (mgd)
1992	.933
2000	1.047
2030	1.530

This company believes that its current source of s
will have sufficient unexplored productive potential to meet this growing demand du

The Heritage
ls
located on either

Potential water resource use conflicts may arise from additional development of t[redacted] is a waste receiving water body. An evaluation of potential impacts of increased groundwater withdrawals on base flows during critical dry periods may be necessary. Such an evaluation may also have to consider existing and anticipated future withdrawals from this aquifer by neighboring water systems.

Meriden Water Bureau

[redacted]

There are three additional sources of supply which may be available to

[redacted]

await the completion of a 1-year baseline study so that environmental effects of utilizing these sources can be more accurately determined.

The Meriden Water Bureau has also indentified several additional options for future sources of supply. These include:

- Exercising an option for a[redacted] interconnections

[redacted]

- [redacted]

[redacted]

- Metering of facilities and leak detection and repair
- Groundwater from bedrock wells (unspecified)

The Meriden Water Bureau estimates that if all of the above options were exercised, they could add an additional 4.1 mgd of safe yield to the system.

Although none have yet been specifically identified, Meriden plans to investigate the possibility for additional interconnections as sources of additional supply.

Proposed new source options are within the Quinnipiac River Basin. This basin has been placed on the updated and annotated List of Basins of Concern by the Connecticut DEP. Concerns identified by the DEP include:

- Wasteload allocation assigned, or to be assigned to improve dissolved oxygen concentrations
- Documented or reported low flow problems
- Overallocation of water resources
- Water quality impairment
- Recreational uses

All of the above would make permitting for increased future withdrawals from this watershed difficult. The Quinnipiac River is now subject to a Water Flow Management Plan which requires future study to assess environmental impacts of increasing withdrawals. Until such studies are completed, new sources within this basin would have to be considered unlikely.

Middletown Water Department

The Middletown Water Department expects that the requirements of the Low Service area will be met by the expans[redacted] development of the Canel Aquifer. These p[redacted]

[redacted]

met

After that year, supply w[redacted]

area through the existi[redacted]

[redacted]

facility on which fuel storage and waste storage occur on-site. Hydrogeologic reports on this site indicate groundwater quality has been degraded; drinking water quality standards or guidelines have been exceeded for some compounds. However, groundwater contamination is not considered so bad as to render it permanently unsuitable for drinking when properly treated. The lateral extent of contamination is not known. Should the [redacted] studies and modeling will be needed to determine the zone of contribution of the well field and to investigate the possibility of drawing contaminated groundwater from the CL&P site.

[redacted]

Water from the existing untrea[redacted]s not meet the water quality requirements of the 1986 Safe Drinking Water Act Amendments due to high color and turbidity. In order to address this issue, the Portland Water Works conducted a test well program to identify additional groundwater sources. A prospective well field along the Connecticut River, between Strongs Avenue and Bell Court was identified. Pumping test results indicate that this well field may be capable of supporting seven wells with a cumulative daily safe yield of 2.2 mgd. This field, along with [redacted], would meet projected demand through the year 2010. When this well field is complet[redacted] would be placed on an inactive status and held for emergency supply.

Portland Water Works plans to start construction of a filtration plant at t[redacted]uring 2010 thus allowing this water supply source to be brought back on-line. Development of the Strongs Avenue well field prior to the construction of the filtration pl[redacted] would delay the need for additional sources of supply until 2010. It is therefore, prudent planning to develop this project first and defer the filtration plant until 2010 when water resources at the Portland

Reservoir would be necessary to meet expected demand. Reactivation of this source, combined with yields from the utilities' groundwater sources, is anticipated to meet the system's projected maximum daily demand to the year 2030.

Although tests at the prospective well field show the water to be of generally good quality, elevated levels of iron and manganese were detected. Water treatment would be required to lower the concentrations of these constituents to recommended drinking water standards.

Portland has applied for the necessary diversion permit. The application was reviewed and Portland is currently providing additional requested information. The utility will re-submit its application for the diversion permit during the 4th quarter of 1989.

Acreage required for the development of this well field is currently being identified. Adjacent lands are being used for residential development and agricultural purposes. Residential zoning in this area currently require a minimum lot size of 15,000 square feet. Future development of this well field would not only require acreage acquisition, but the establishment of an aquifer protection program. Such a program would necessarily deal with such zoning issues as:

- Possibly increasing the minimum lot size for residential development
- Sewer and/or septic system avoidance
- Road salting practices, both storage and application
- Pesticide, herbicide, and fertilizer use on both agricultural and residential land.

South Central Connecticut Regional Water Authority

There are several alternative sources under consideration by the SCCRWA [redacted] This is a desirable source since the Authority already owns substantial land, aquifer protection programs are in place, water treatment facilities are present, and the well field is in a location desirable for serving water to Cheshire. It [redacted]

[redacted]s required by the December 30, 1988 decision rendered by the Commissioner of the Department of Environmental Protection, the Authority is required to implement a preliminary monitoring program intended to document and evaluate existing conditions of wetlands, surface water and groundwater in the area of the well field. The required study period is 12 months and began in June 1989 and will continue to May 1990. The study period must be completed prior to the initiation of additional permitted groundwater withdrawals. The Authority anticipates implementation of the 2.8 mgd additional withdrawals from this well field during the Summer of 1990 following completion of the preliminary [redacted]ity's 3-year monitoring plan. [redacted] inactive because it does not [redacted]nd turbidity. A new treatment facility would be required to bring this source back into use, although this is not scheduled at this time. The major potential land-use conflict that has been identified is the location of transportation routes near the reservoirs and watercourses. The effects of these may be mitigated through proper regulations concerning road maintenance and chemical deicing practic[redacted] Once this source is brought back into use, there may be potential impacts from the diversions on downstream resources such as recreational use and wetlands.

The Authority's short-term pla[redacted] are to replace it with a new facili[redacted] the original plant, while long-term plans include a potential expansion to an ultimate capac[redacted]s will incre[redacted]d the long term, ultimate [redacted]al conflicts to consider. [redacted]y developed, however, the area is already [redacted]n's watershed and aquifer protection programs, and the effects should be minimal.

The increased diversions from [redacted]uring high flows may impact fresh water and tidal marshes downstream. With less fresh water moving downstream, average salinities in the tidal river may increase, reducing the area of tidal fresh water marshes and leading to vegetation changes.

The downstr[redacted]rridor includes the Eli Whitney Historical Museum and East Rock Park in New Haven. The Authority recognizes that

altering flow release [redacted] change aesthetics and habitats in these areas. The Authority will be working with the responsible New Haven and state agencies along with concerned citizens' groups to resolve these issues.

Like the Connecticut Water Company, the South Central Connecticut Regional Water Authority has identified potential water sources that now have water classifications which restrict their use as a water supply; the Connecticut River which is currently Class B, and the Housatonic River which is Class C. The Authority recognizes the potential for substantial downstream impacts resulting from significant withdrawals from these rivers. Thorough evaluations and environmental impact studies would have to be undertaken to quantify these impacts, balance water supply needs, and mitigate adverse results. However, such a proposal would not be considered by the WUCC until it could be ascertained that, at some time during the 50-year planning period, there is a need and that no other feasible or viable alternative will be available to meet this need.

The Authority has identified the Salmon River in East Haddam as another potential source for a major diversion. Discussions have been initiated with the DEP that center on the use of this Class A stream as a future water source for several utilities including the SCCRWA, Connecticut Water Company, Wallingford Water Division and others. The multiple-use issue associated with the availability of this river for water supply will need to be resolved.

Wallingford Water Division

The Wallingford Water Supply Plan stated that options for alternative sources will be based on continued residential, commercial, and industrial growth trends. If short-term system improvements are implemented as anticipated, the Wallingford System will have a sa[redacted]he Division maintains a 15 percent margin of safety, the need for additional supply could occur in the year 2015. At that time, an additional 1 to 2 mgd safe yield would provide Wallingford with water supplies with a 15 percent margin of safety until 2030.

The Wallingford Water Division has identified the following options as potential future alternative sources of supply:

- Interconnections with th[redacted]
- Groundwater wells in the Muddy River Aquifer with a potential for 2 mgd

- A diversion on the Farm River with a potential for adding 2.2 mgd to Wallingford's water supply
- Construction of the Tyler Mill Reservoir for storage of diversions from the Muddy River capable of providing an additional 2.6 mgd
- Potential utilization of company-owned lands in Durham, however, this is not likely to be pursued during the 50-year planning period.

The above options which are currently within the Wallingford Water Division's 50-year plan are the interconnection with the SCCRWA and development of groundwater wells in the Muddy River Aquifer. The SCCRWA interconnection is an option that has only been identified. Contract negotiations have not yet started.

Prior to developing groundwater resources in the Muddy River Aquifer, Wallingford Water Division would have to acquire the necessary acreage. The Water Division will have to acquire a water division permit for this development. Since the Muddy River is tributary to the highly stressed Quinnipiac River, permitting for withdrawals from the Muddy River basin may be difficult as potential impacts on the Quinnipiac will likely be of concern to the DEP.

The Farm River diversion option also identified, may present conflict with the SCCRWA's current use of this river which will have to be resolved. The Farm River is currently utilized by the SCCRWA for public water supply. There are diversions to Lake Gaillard at points upstream and downstream of the proposed Wallingford diversion. Also, there is a downstream diversion in East Haven t[redacted] Acquisition of water rights would be necessary to develop this option. It should also be noted that the Farm River is listed as a major trout stream by the Fisheries Bureau.

Plans are currently underway to design and construct a new water treatment plant having a maximum capac[redacted] There are DEP concerns that these activities may affect populations of Connecticut "Species of Special Concern" known to be present in the area. Plans for activities will be required to determine if any of these populations will be affected. Possibly, additional field work may be required.

Basins of Concern

If the future alternative source options currently contained within individual utilities' water supply plans are developed and contribute the

yields expected, then the companies should have sufficient supply to meet anticipated demand through the year 2030. However, if some of the options cannot be developed, additional options would have to be considered. A number of the future source options identified fall within water bodies that are on DEP's List of Basins of Concern. These water bodies include the:

- Quinnipiac River
- Tenmile River
- Broad Brook
- Mill River
- Hammonassett River

The reasons water bodies have been included on this list vary. To date, some have been more severely impacted than others. For example, the Quinnipiac River is on the list due to dissolved oxygen problems, low flow problems, perceived overallocation of water resources, water quality issues, and competing recreational uses. Due to the stress currently imposed on the Quinnipiac, plans for future additional diversions would have to be considered as uncertain. However, a water body such as the Tenmile River which is on the list because it is tributary to another impaired water body, should be considered as a more certain source for future water supplies.

The WUCC recognizes the principle of multiple use and the need to apply it to water resources. The reasons water bodies have been placed on the List of Basins of Concern are important and must be considered in planning and development programs. However, the WUCC also believes that of all competing uses for water resources, public water supply must be given the highest priority, especially in the future as demand continues to grow and new high quality source alternatives become increasingly limited.

Quinnipiac River Water Flow Management Plan

In 1985 and 1986 the Town of Southington, the Town of Meriden, and the SCCRWA filed a total of four applications seeking diversion permits under the 1982 Diversion Act. The act states that a permit is required before any new water diversions can take place. The Town of Southington requested authorizatio[redacted] northeastern Southington, to replace sources lost to contamination. The Town of Meriden reque[redacted] located east of Orego[redacted]

[redacted]

In January 1987, Mr. Thomas Morrissey, P.E., of the Water Compliance Unit of the DEP issued a report on the projected water quality in the Quinnipiac River during low flow if the diversion permits requested were granted. The report, entitled "Water Quality Analysis of the Quinnipiac River," concluded that the additional withdrawals could "diminish river flow and reverse the trend of improving water quality." The report also made several recommendations including alternatives for pumping during low flows. The applicants objected to the recommendations and further studies by Mr. Morrissey were conducted to determine the affects of reduced pumping during periods of low flow. In May 1988, maximum pumping rates with a schedule of reduced pumping rates at stream flows below 80 cubic feet per second (cfs), 65 cfs, and 50 cfs were proposed. Because periods of low river flow often correspond with periods of high demand for water supply, these reduced pumping rates become necessary to protect the total water resource within the river basin.

Public hearings were held on July 11 and 13, 1988 and a proposed decision was issued by the Hearing Officer on August 15, 1988. An oral argument requested by the Quinnipiac River Watershed Association (QRWA), was held on October 17, 1988 and written briefs responding to the QWRA's questions and concerns were received from the Towns of Southington and Meriden and the SCCRWA by November 2, 1988. On December 30, 1988, the permits were granted to the applicants with the main conditions being:

- [redacted]
- [redacted]
- The diversions may not take place until the Department has reviewed and approved a River Flow Management Plan. This plan involves the SCCRWA obtaining Quinnipiac stream flow data from the United States Geological Society's (USGS) computer system. This stream flow data determines the pumping rate for the diversions based on

Mr. Morrissey's proposed schedule of maximum pumping rates at various stream flows. The SCCRWA is then responsible for distributing this data to the Towns of Southington and Meriden. The pumping schedule is contained in the Appendix.

- The applicants shall submit a monthly statement to the DEP summarizing when pumping rates were reduced in response to the USGS stream flow data. The statement shall contain the amount of pumping reduction and the duration that the reduction took place.

- The Department may order any applicant to reduce pumpage based on stream flow data or information indicating adverse impacts on the Quinnipiac River or the potential that adverse impacts are likely to occur.

- The applicants may not commence pumping until the Department has reviewed and approved monitoring plans for monitoring groundwater levels, stream flow of tributaries and the present condition of potentially affected wetlands. Once approved, the applicants shall commence at lest 1 year of data collection to establish a pre-pumping baseline. This data is to be submitted to the Department.

- The applicants must submit to the DEP for its review and approval, plans for monitoring the impacts of the diversions on stream flows, groundwater levels, and flora and fauna at affected tributaries and wetlands.

- The data gathered under the monitoring plan shall be analyzed by the applicants and submitted to the DEP.

- Reduction in pumping may be ordered by the Department based on any data gathered under the monitoring plan.

- The permits shall expire 3 years after the diversions commence. The permits must then be renewed by filing applications in accordance with Connecticut General Statutes 4-165 through 4-189 and should contain long-range water conservation plans, alternative assessments, and all other information listed in 22A-369 or otherwise requested.

D. OTHER REGIONAL ALTERNATIVES

As discussed earlier, the WUCC philosophy is to develop local new source options first, then expand into regional projects such as those above. The WUCC recognizes that many of these options may be viable alternatives for future supply but that they would entail expensive engineering feasibility and design studies. Projects such as these are reserved for future consideration as more local and cost-effective source alternatives become more limited.

Additional regional alternatives for future supply have been identified. These include:

[redacted]

- Development of additional y[redacted] through Waterbury for joint use potentially by some or all of the following: Naugatuck, Prospect, Bethany, Oxford, Seymour, Ansonia, and Derby. A regional joint-use treatment plant may also be required.

- Flood skimming o[redacted]rs and a regional pipeline westward to Hammonasset Reservoir. From there water would be wheeled through existing SCCRWA transmission lines for stor[redacted] expanded or regional treatment plant may be required. This water could be shared among CWC, SCCRWA, Meriden, Wallingford, and others.

[redacted]

It has been reported to the WUCC by DEP, that the potential yield of several aquifers currently being used for water supply along the Connecticut River, exceeds their planned use. These are identified on a map entitled "Groundwater Yields for Selected Stratified Drift Areas in Connecticut", DEP 1986, and include aquifers identified as 40-4, 40-7, and 40-8.

The State IWRPB has identified a number of options for potential future water supply that are within the South Central Public Water Supply Management Area. These options include:

- Potential Reservoirs

  - Parmalee Brook in Durham
  - Sawmill Brook in Durham

- Potential Diversions

  - Coginchaug River in Durham
  - Menunketesuck River in Killingworth
  - Pond Meadow Brook in Killingworth
  - Muddy River in North Haven
  - Dowd Hollow Brook in Madison
  - Iron Stream in Madison
  - Neck River in Madison

- Potential Expansion of Existing Reservoirs or Diversions

[redacted]

Projects concerning several of these water bodies have been identified by utilities. The Connecticut Water Company is involved in a project to expand [redacted] River. Both Wallingford and the SCCRWA have identified the potential for additional diversions from the Muddy River through aquifer development. The SCCRWA option, in North Haven is not included in their current plan of development. The Wallingford option, in the Town of Wallingford, is within their plan and is expected to be developed by the year 2000. The SCCRWA has also identified the Iron Stream as a potential source for additional diversions. The [redacted] is not currently included in Middletown's plan for development. Options listed above that currently are not planned for development will be considered by WUCC members in their future planning efforts.

E. SMALL UTILITIES

Within the South Central Public Water Supply Management Area, there are 49 small water utilities which serve 1,000 people or less. Table 3-4 summarizes the following information regarding those 49 utilities.

- Whether there are plans for future expansion
- Whether the utility has only a single source of supply
- Whether the utility has experienced supply shortages
- Whether the utility is currently considering future additional or alternative sources of supply

Because future demand projections were not available for the majority of these small utilities, water consumption is projected to remain at 1987 levels throughout the planning period reflecting the unchanged future status of most of the small suppliers. The cumulative maximum daily consumption for the listed 49 smaller utilities in 1987 was approximately 2.90 mgd.

Table 3-4 indicates that 21 small utilities currently depend on a single source of supply. Most of these do not have an alternative source in the event their primary water supply is lost. These utilities should consider additional or alternative sources of supply to provide during periods of extreme system stress, or failure.

Ten small utilities reported having periodic supply problems when demand exceeds capacity for supply. Of these ten, five are also part of that group of 21 suppliers which rely on a single source of supply.

The continuing adequacy of a source of supply also depends on the vulnerability of that source to contamination. Of the 49 companies on Table 3-4, 30 have reported some form of contamination requiring treatment. At this time, many of the contamination problems are violations of aesthetic rather than primary health standards. However, since most of these small suppliers have groundwater sources of supply, violations of aesthetic standards serves as a reminder of the vulnerability of groundwater resources, and the need to evaluate and provide for additional sources of supply.

Table 3-4 also indicates which of the small utilities are currently considering additional sources of supply. Available information identifies only seven of the 49 utilities as considering other options. Of these, two recognize the need but have not yet specified an alternative.

The WUCC membership acknowledges the responsibility of larger utilities to help resolve supply and water quality problems experienced by smaller organizations. Companies experiencing such problems may be candidates for satellite management by a larger organization. The WUCC recommends that should satellite management become necessary, this function would fall to the large utility closest to the troubled utility. For those which are questionable by being located between the exclusive service areas of two larger utilities, DPUC would assign the management responsibility to one of the large utilities.

Although these small utilities volumetrically comprise only a small portion of the total water needs of the South Central Public Water Supply Management Area, their requirements must be assured. Therefore, the above suggested satellite management solution and/or other forms of joint-use arrangements must be carefully considered to provide for continued fulfillment of their water supply needs.

TABLE 3-4
SMALL UTILITY SUMMARY

Utility	Expansion Plans	Single Source of Supply	Supply Problems	Water Quality Problems	New Sources Considered
Aaron Manor	No	[redacted]			
Amston & Beseck	Yes				Yes - Unidentified
Beechwood MHP*	No				
Bernice's Court*	No				
Bittersweet Ridge	No				
Blue Trails Assoc.	No				
Bradley Home*	No				
Cedar Grove MHP*	No				
Country Manor*	No				
Crestview Condo. Assoc.*	No				
Descrocher Apts.	No				
Dogwood Acres	No				
Durham Center	No				Yes - Unspecified Well
Ed's Trailer Park	No				
Evergreen Trailer Park	No				
Gendrons Valley MHP	No				
Green Springs*	No				
Grove School	No				
Haddam Elderly Housing	No				
Happy Acres	No				
Harmony Acres MHP	No				Yes - New Well, Same Aquifer
Hawkstone Terrace	No				
Hemlock Apts.	No				
Henry's Trailer Park*	No				
Heritage Cove Condos	No				

[redacted]

[redacted]

TABLE 3-4 (Cont)
SMALL UTILITY SUMMARY

Utility	Expansion Plans	Single Source of Supply	Supply Problems	Water Quality Problems	New Sources Considered
Highland Heights	No				
Hillview Water Assoc.*	No				
Idleview MHP*	No				Yes - Possible CWC Interconnection
Krayeske Water Supply	No				
Lakeside Water Co.*	No				
Lake Grove	No				
Leetes Island	No				
Legend Hill Condos*	No				
Lorraine Terrace	No				
Meadowbrook Rest Home	No				
Mill Pond Elderly Housing	No				
Mt. St. John School	No				
New Lakeview Convalescent Home*	No				Yes - Interconnect with Waterbury
Nod Hill Apts.*	No				
Northford Glen Condos	No				
Our Lady of Grace Monastery*	No				
Quonnipaug Park Water*	No				
Ridgewood Hill Condos	No				
Rivercrest Water Co.	No				Yes - Connect up 3-4 Private Wells
Sugarloaf Elderly Housing	No				
Sylvan Ridge Condos	No				
Twin Maples Nursing	No				
Walden III Condos	No				
Westlake Lodge Nursing*	No				

[2]CWC provides additional supply during emergencies and drought.
* Utilities located within a D.E.P. Basin of Concern.

F. POTENTIAL SOURCE DEVELOPMENT PLAN CONFLICTS

Each of the large utilities has identified options for increasing water supply to respond to future demand growth. Each option identified is appropriate to the particular utility planning to develop it. However, it is possible that more than one utility has identified future options that may interfere with one another if all are developed. Those identified to date are:

- Several utilities have identified options which may effect low flow characteristics of the Quinnipiac River. SCCRWA has proposed additional North Cheshire Well Field wells whose withdrawals may impact the river. SCCRWA is also considering reactivating the Prospect Reservoir diversion which may reduce flows to the river. Wallingford is evaluating the option of developing a Muddy River Well Field which may further reduce flows into the Quinnipiac River. While these plans are under consideration, the Meriden Water Department water supply report states that their ability to pump groundwater is restricted by current low flow characteristics in the Quinnipiac River.

- Both the South Central Regional Water Authority and the Wallingford Water Division propose to develop additional groundwater wells along the Muddy River. These two utilities hope for increased safe yields of 1.5 mgd and 2.0 mgd, respectively. It is possible these two projects may interfere with each other.

- Wallingford identified the Farm River diversion option as a potential new source. This may conflict with the SCCRWA, which currently utilizes this river for public water supply through diversions to Lake Gaillard and Lake Saltonsall.

- The SCCRWA currently has contractural agreements to provide the [redacted] within the Quinnipiac River Basin, the Meriden Water Bureau and the Wallingford Water Division have both identified the SCCRWA as a source of additional future supplies. Such continued reliance on the SCCRWA for increased water supplies may necessitate the development of an a[redacted] Q c a a

The WUCC recommends that conflicts and disagreements be handled in the following manner.

- Attempt to negotiate a solution agreeable to all entities involved.

The WUCC members are also concerned about the future availability of Class A water bodies not currently utilized for public water supply, such as the Salmon River. As other surface water sources, such as the Quinnipiac River, became increasingly stressed, the need for access to Class A rivers will also increase.

This WUCC considers the Salmon River as a viable future supply option. This WUCC is also concerned that DEP's fisheries and other environmental projects within this basin may be committing the Salmon River to water resource uses other than water supply. This may conflict with adopted state policy as outlined within the State Policies Plan for the Conservation and Development of Connecticut 1987-1992 (C & D Plan). This plan recommends review of State plans and projects to ensure that they do not irreversibly commit to other uses any significant potential water supply sources.

Constructing new surface supply reservoirs or creating additional storage by enlarging existing reservoirs is often considered by public water suppliers as a means for meeting the growing demands of a service area. The WUCC believes that under current regulatory constraints, the ability of water utilities to continue to realistically plan these types of source expansions is becoming increasingly difficult and risky.

Under the Federal Clean Water Act, Section 404(c), EPA has the authority to prohibit or restrict the discharge of dredged or fill material into U.S. waters, including wetlands, if it believes that such discharge will have an unacceptable adverse affect on the environment. On January 23, 1989, EPA issued a notice of Proposed Determination to prohibit the use of Rhode Island's Big River, and its tributaries and adjacent wetlands as disposal sites in connection with the construction of a drinking water reservoir. This project, conceived of in the 1950's, has been under progressive development by its proponent, the State of Rhode Island Water Resources Board, since the late 1960's. In making this proposed determination, EPA indicated that they consider impounded water as "fill" and that this fill will have an unacceptable adverse impact on one or more of the pertinent resources. In this case, the noted resources are wildlife habitat and fisheries.

Several public water utilities within the South Central planning area have indicated in their individual water supply plans, a need to plan for supplementing current supplies through reservoir expansion or construction projects.

By this case, it is apparent that EPA is requiring substantive documentation considerably beyond that which has historically been required.

The growing regulatory requirements for considering the development of surface water supplies include a comprehensive evaluation that must unequivocally substantiate the need and conclude that there are no other alternatives. Based on these imposed requirements, the WUCC suggests that a public water utility's plan for developing surface supplies take into consideration the potential for a more prolonged and expensive regulatory process.

The WUCC members also recommend that as EPA decisions such as that above occur, all interested utilities should take advantage of the public response period to comment on such rulings and establish a history and documentation of their objections.

As the Amendments to the Safe Drinking Water Act (SDWA) begin to take effect, treatment required for both surface and groundwater sources will become increasingly restrictive. At a minimum, these amendments will require filtration for all surface sources and require disinfection of water from all sources. Above these, many sources may also need additional treatment for specific water quality characteristics.

As demand for water increases in the future, many towns and utilities may need to consider cleaning up and utilizing sources having water quality problems. The treatment required will have a major impact on costs of bringing such sources on-line and may, in fact, become increasingly a major factor in deciding whether or not to use such sources. Also, the frequent monitoring, chemical analyses, and water quality reporting will be beyond the financial and technical capabilities of many of the smaller utilities within the South Central Connecticut area. This would, in turn, place a larger responsibility on the larger water suppliers to monitor water quality of smaller companies through some form of satellite management or joint-use arrangement.

H. WATER CONSERVATION

Like most other natural resource extractive industries, the first developed and utilized resources are those which are most easily found and the least expensive to produce. Compared to the costs of other utilities and obligations, the price of fresh water has been low and the average consumer has, therefore, devoted little thought to the complex natural and manmade systems that provide that water.

However, as demand continues to increase, utilities may have to seek and develop less desirable sources, i.e., those that are more expensive, have lower safe yields, or water of poorer quality. For any of the above reasons, the incremental cost of delivering additional water to the consumer increases. Therefore, with any discussion of alternative sources, it is also appropriate to deal with the subject of conservation.

Although there has been no specific charge for developing an areawide plan for water conservation, it is apparent from a review of the water supply plans of the larger utilities, that water conservation is considered an important issue. It is an element of both demand projections and evaluation of supply alternatives. Table 3-5 summarizes the various methods of water conservation that are in practice, and others that are under consideration for future implementation. Most of the utilities discussing conservation have recognized that it should be a program having discrete steps for both the utility and the consumer. However, because supply conservation measures are more easily encouraged and controlled, they receive greater attention than those controlled by the consumer demand. More emphasis is also placed on conservation by the industrial sector through recycling and multiple use of water. An industry, driven by the profit motive, concerned about fixed overhead costs, and consistently using large quantities of water, is more driven to institute cost-effective conservation measures than the residential consumer.

In addressing the residential consumer, most water supply plans recognize that peak residential consumption tends to occur during the portions of the year when evapotranspiration normally exceeds precipitation and recharge is lowest. Most utilities recognize the need to educate the residential consumer about water supply and inform them of periods during which supply problems are occurring. Some of the larger utilities currently inform consumers of water saving devices, check and attempt to identify causes of abnormal utilization, and encourage voluntary reductions

TABLE 3-5
ELEMENTS OF CONSERVATION IN PRACTICE OR PLANNED

	Ansonia Derby	Bridgeport Hydraulic	CWC	Connecticut Valley Hospital	Cromwell Fire District
Leak Detection	*	*	*	0	*
Leak Repair	*	*	*	0	*
Metering & Testing	*	*	*	0	*
Abnormal Use Checks	*	*	*		
Watershed Protection		*	*	0	
Use Studies				0	
Site Reviews Zoning		*	*		0
Provide Water Saving Devices	0	0	0	0	0
Public Ed. Program	*	*	*	0	0
Voluntary Reductions			*	*	
Price Incentives					
Seasonal Price Adj.					
Quotas/Bans/ Regulations			*	0	
Computer Modeling				0	
Water Audits			*	0	

* = Elements of conservation in practice.

0 = Elements of conservation planned.

TABLE 3-5 (Cont)
ELEMENTS OF CONSERVATION IN PRACTICE OR PLANNED

	Heritage Village Water	Meriden Water Bureau	Middleton Water Dept	Portland Water Works	SCCRWA	Wallingford Water Division
Leak Detection	*	*		*	*	0
Leak Repair	*	*		*	*	0
Metering & Testing	*			*	*	*
Abnormal Use Checks					*	
Watershed Protection					*	*
Use Studies	*	0				
Site Reviews Zoning		0			*	0
Provide Water Saving Devices	0	0	0	0	0	0
Public Ed. Program					*	0
Voluntary Reductions	*				*	*
Price Incentives					0	0
Seasonal Price Adj.						0
Quotas/Bans/ Regulations					0	
Computer Modeling					0	0
Water Audits		0		*	0	

* = Elements of conservation in practice.

0 = Elements of conservation planned.

- Conservation as a decision-making priority
- Conservation through technical means and measures to promote efficiency
- Prevention of reductions in future water supplies
- Balancing competing water needs equitably and at a reasonable price

Public Act 89-266 entitled "An Act Establishing a Residential Water Saving Program," requires public and investor-owned water companies serving 1,000 or more people or with 250 or more service connections to have available for the consumer, free water saving devices for shower heads, faucets, and toilets by January 15, 1991. Each year afterwards, the company must (1) notify residential consumers that the devices are available, (2) give consumers the devices on request, and (3) give a copy of the consumer notice to the Health Commissioner along with a report on the number of devices supplied.

Public Act 89-303 entitled "An Act Concerning Minimum Efficiency Standards for Plumbing Fixtures," requires that minimum efficiency standards for plumbing fixtures be set by the Department of Consumer Protection Commissioner. The Bill prohibits the sale or installation of fixtures that do not meet the standards after October 1, 1990, and toilets not meeting standards after January 1, 1992.

The South Central WUCC supports the passage of these Bills and plans to actively participate in implement these policies.

I. IMPLEMENTATION PLANS

The WUCC representing the South Central Public Water Supply Management Area, having considered the options for future water supply alternatives presented within individual water supply plans, recommend a new source implementation system similar to that outlined in Table 3-3. Additional recommendations from this WUCC are summarized below:

- The WUCC should continue into the future and plan to reconvene at least on an annual basis. The responsibilities of the WUCC will be to review and approve significant changes to the Coordinated Plan, identify problems and conflicts that have arisen between or among utilities during the year, and to attempt to resolve those issues through negotiation or mediation as discussed earlier.

- The WUCC recommends that the Department of Health Services be designated as the lead agency to establish margins of safety of supply over demand for each utility. Margins of safety should be determined individually for each utility and acknowledge the need for providing for peak and maximum demands, fire flows, and design standards.

- It is the position of the WUCC that it is a utilities' mandate to provide safe and secure water supply to meet demand. The utilities do not have the authority to limit growth or regulate industries' activities. Therefore, utilities encourage all municipalities to protect resources and limit demand growth if resource availability is limited.

- The WUCC strongly favors a program of interconnections whenever it is financially and physically practical to do so. In the short-term, this is especially important for the small suppliers. However, this approach will also strengthen the larger utilities in terms of emergency capacity. The WUCC also encourages consideration of interconnections with other systems outside this management area having surplus capacity, e.g., Waterbury and the Bridgeport Hydraulic Main System.

- This WUCC strongly endorses Public Act 89-327 requiring the DPUC, DOHS, and DEP to define a single set of standards and requirements for water conservation and emergency contingency plans. The WUCC recommends that common standards be expanded into other water resource areas where agencies' responsibilities overlap, e.g., safe yield determinations.

- The WUCC recommends that once water resources are dedicated to water supply, they will not be reallocated for other purposes in the future.

- The WUCC believes that evaluations of requests for diversion permits should be based on actual amounts of water withdrawn, not on the structural capacities of elements of the system.

- The WUCC endorses the new Public Acts 89-266 and 89-303 regarding conservation and strongly encourages its members to fully support conservation programs within their systems. The WUCC also recommends that utilities routinely set aside funds for further development and refinement of conservation programs and conservation education.

- The WUCC strongly recommends that water supply be granted the highest priority on issues regarding the multiple use of water resources.

IV. LAND-USE COMPATIBILITY

A. INTRODUCTION

The South Central Connecticut Water Supply Management Area is rich with water supply sources, both from surface supplies and stratified drift aquifers. Essential components of a water supply management plan include:

- Land-use conflicts with water supply
- Risks of contamination presented by conflicting uses
- Aquifer/watershed protection mechanisms

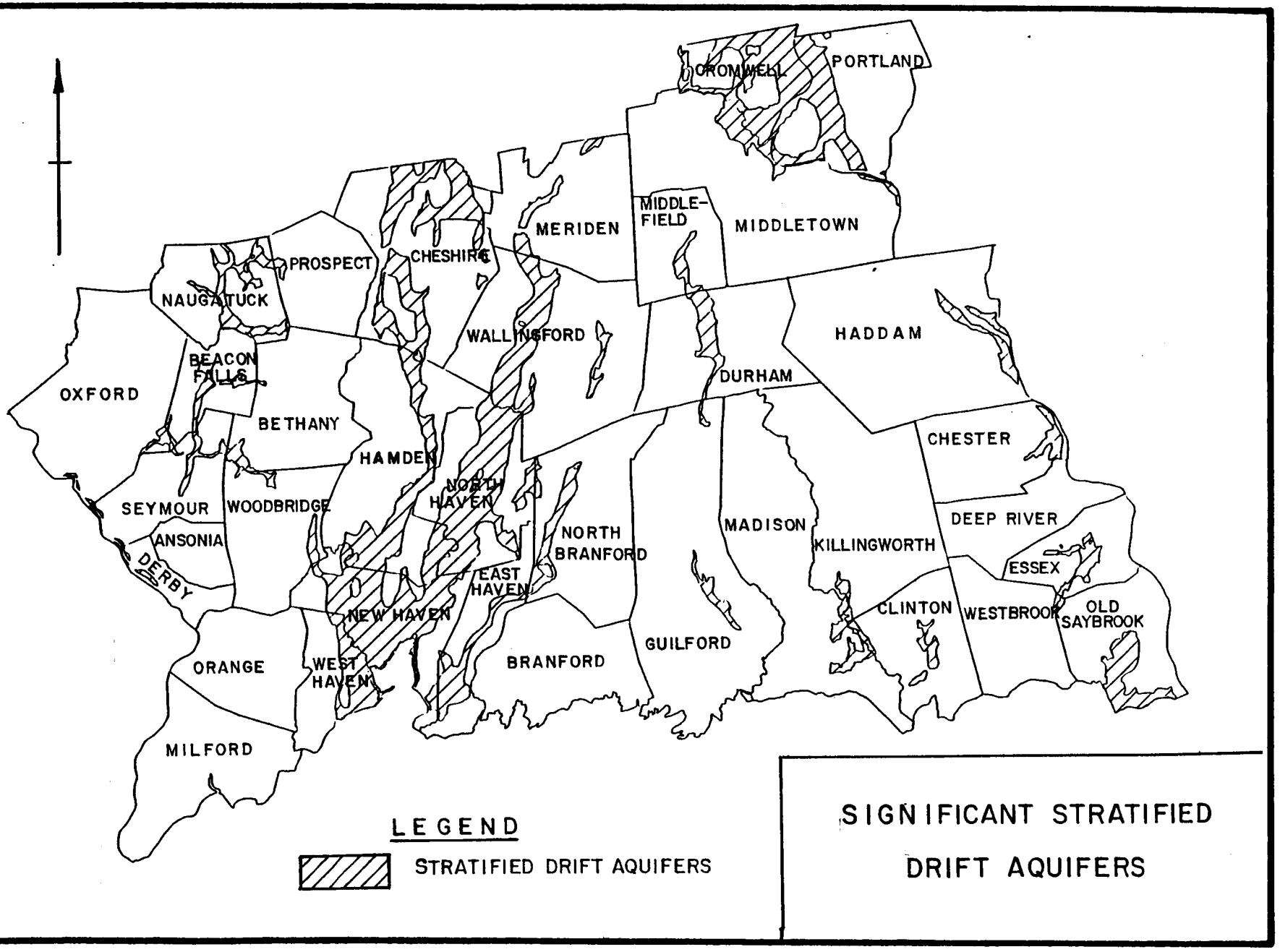
The distribution of water resources within the South Central Connecticut Water Supply Management Area is demonstrated on the following two figures. Figure 4-1, is a map which identifies the major stratified drift aquifers in this region. Figure 4-2 is a map depicting the existing and potential water supply watersheds identified by WUCC members, regional planning organizations and state government.

The map on Figure 4-1 is from the Connecticut Department of Environmental Protection's ARC/INFO Geographic Information System and is based on maps earlier generated by Meade (1978) and Mazzaferro (1986). The definition of aquifer, as applied to this map, is those areas having a minimum saturated thickness of 10 feet and possibly capable of yielding moderate to large amounts of groundwater. It should be noted that in some cases utilities have existing or planned water sources in aquifers that are not identified on the state maps. These aquifers may not be large in areal extent and therefore, are not regionally significant. They are, however, critical for public water supply. The map on Figure 4-2 was also derived from the Connecticut Department of Environmental Protection's ARC/INFO system. The source of information for watershed areas was the Atlas of the Public Water Supply Sources and Drainage Basins of Connecticut.

Table 4-1 shows the areas of stratified drift aquifers and watersheds, both by municipality and for the entire South Central Connecticut region. This table also shows the percentage of each municipality and the total region that is comprised of aquifers, watersheds, or both. Since watersheds frequently overlie aquifers, the total resource area is not always the sum of aquifer area plus watershed area. Of the 808.7 square miles within the South Central Connecticut Management Area, approximately

132959

MAKEPEACE



SIGNIFICANT STRATIFIED DRIFT AQUIFERS

Whitman & Howard, Inc.

FIGURE 4-1

Whitman & Howard, Inc.

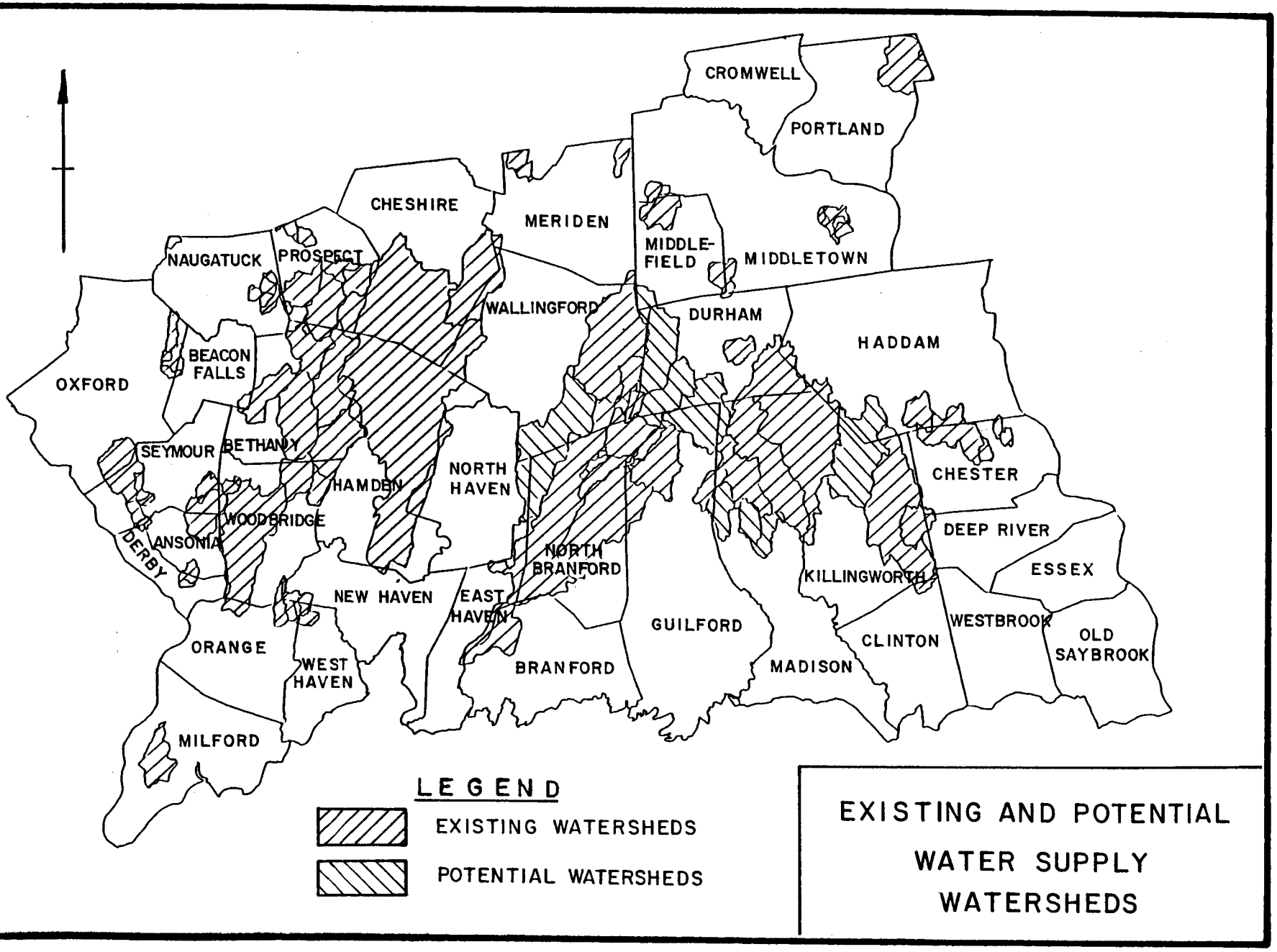


FIGURE 4-2

EXISTING AND POTENTIAL WATER SUPPLY WATERSHEDS

TABLE 4-1
PERCENT WATER RESOURCE AREAS BY MUNICIPALITY
(IN SQUARE MILES)

Town	Town Area	Aquifer Area	Watershed Area	Resource Area	% Town Area
Ansonia	6.2	0.00	1.51	1.51	24
Beacon Falls	9.8	1.11	0.50	1.16	12
Bethany	21.6	0.63	14.92	15.52	72
Branford	27.9	0.00	2.21	2.21	8
Cheshire	33.0	11.00	15.78	21.45	65
Chester	15.9	1.10	2.84	3.98	25
Clinton	17.2	0.80	0.13	0.95	6
Cromwell	13.5	5.36	0.00	5.36	40
Deep River	14.2	0.00	0.13	0.13	1
Derby	5.3	0.13	0.44	0.57	11
Durham	23.3	2.08	11.80	13.57	58
East Haven	12.6	3.03	1.89	4.73	38
Essex	12.2	1.39	0.00	1.39	11
Guilford	47.7	0.95	8.20	9.15	19
Haddam	46.7	2.02	4.42	6.44	14
Hamden	33.0	6.25	21.45	25.24	76
Killingworth	36.0	0.63	23.35	23.98	67
Madison	36.3	1.26	14.13	15.40	42
Meriden	24.0	1.70	1.58	3.28	14
Middlefield	13.3	0.76	2.52	3.28	25
Middletown	42.9	1.96	2.27	4.23	10
Milford	23.5	0.00	1.77	1.77	8
Naugatuck	16.2	2.78	1.26	4.04	25
New Haven	21.1	11.60	0.69	12.30	58
N. Branford	26.8	1.83	21.45	21.45	80
N. Haven	21.0	11.40	2.27	13.12	62
Old Saybrook	18.3	3.47	0.00	3.47	19
Orange	17.6	0.00	1.26	1.26	7
Oxford	33.0	0.63	2.71	3.34	10
Portland	23.7	5.87	3.28	9.15	39
Prospect	14.3	0.25	7.13	7.38	52
Seymour	14.7	0.76	3.66	4.42	30
Wallingford	39.8	6.94	18.74	23.66	59
Westbrook	16.2	0.06	0.00	0.06	<1
West Haven	10.6	3.47	0.57	4.04	38
Woodbridge	19.3	0.63	11.04	11.67	60
Totals	808.7	92.98	205.90	284.66	35

285 square miles contain aquifers and/or existing and potential watershed supply areas. Therefore, 35 percent of the total region can be considered as important water supply resource.

These maps and Table 4-1 refer only to the water resource area. These sources demonstrate the magnitude of the water resource present within various municipalities. This should be further clarified since some of the aquifers identified on Figure 4-1 include areas of water resource which have been, or potentially may be, influenced by brackish conditions or by other forms of contamination. Therefore, the areas presented in Table 4-1 may be considered as optimistic when considering only uncontaminated water resources.

The resource areas are not evenly distributed among the municipalities; some have extensive water resources while others have almost none. Greater than 50 percent of the total acreage in each of these following communities is considered water resource area; Bethany, Cheshire, Durham, Hamden, Killingworth, New Haven, North Branford, North Haven, Prospect, Wallingford, and Woodbridge. Table 4-2 lists water supply watersheds within the South Central Connecticut area.

The public trust that water resources are protected and that water purveyors and consumers are responsible for their protection. However, the unequal distribution of resources among communities places the burden of aquifer/watershed protection more on some than others.

Historically, waterways provided sources of energy and means of transportation, which resulted in early development of contiguous commerce and industry. Communities which desired to attract industry, did so by offering flat-lying land with good water sources (i.e., those areas within the glacially sculptured valleys containing major waterways and the majority of the principal stratified drift aquifers). Paradoxically, the characteristics which created the sensitive water resource areas are the same which encourage threatening development.

The character of development, therefore, has been shaped by the communities' zoning practices, or lack thereof. Generally speaking, the distribution of potentially harmful land uses near waterways and overstratified drift aquifers, indicates that the process of determining land use has not been particularly sensitive to water resource protection issues. Tables 4-3 and 4-4 list a summary of cited groundwater and surface water contamination problems, respectively, within the South Central Area.

TABLE 4-2
EXISTING AND POTENTIAL WATERSHEDS

Municipality	Watershed	Existing or Potential
Ansonia	[redacted]	
Beacon Falls		
Bethany		
Branford		
Cheshire		
Chester		
Clinton		
Deep River		
Durham		
East Haven		

TABLE 4-2 Cont.)
EXISTING AND POTENTIAL WATERSHEDS

Municipality	Watershed	Existing or Potential
Guilford	[redacted]	
	Iron Stream	P
	Parmelee Brook	P
	Coginchaug River	P
Haddam	[redacted]	
	Pond Meadow Brook	P
Hamden	[redacted]	
Killingworth	[redacted]	
	Pond Meadow Brook	P
Madison	[redacted]	
	& Iron Works Stream	
	Iron Stream	P
	Neck River	P
	Dowd Hollow Brook	P
Meriden	[redacted]	
Middlefield	[redacted]	
Middletown		
Milford		
Naugatuck		

TABLE 4-2 (Cont)
EXISTING AND POTENTIAL WATERSHEDS

Municipality	Watershed	Existing or Potential
New Haven	[redacted]	
North Branfor		
	Muddy River	P
North Haven	[redacted]	
Orange		
Oxford		
Seymour Reser		
Portland		
Prospect		
Seymour		
Wallingford		
	Muddy River	P

TABLE 4-2 (Cont)
EXISTING AND POTENTIAL WATERSHEDS

Municipality	Watershed	Existing or Potential
West Haven	[redacted]	
Woodbridge		

TABLE 4-3
GROUNDWATER DISCHARGES

Municipality	Landfill Site	Transfer Station	Contaminated Well	Leach Field	Septage Lagoon	Wastewater Discharge	Industrial Lagoons	Agricultural Waste	Failing Septic System	Misc.	Cooling Water	Auto Junkyard	Road Salt Storage
Ansonia	2	-	-	-	-	-	1	-	-	1	-	-	1
Beacon Falls	4	-	3	-	-	-	3	-	1	-	-	-	3
Bethany	1	-	-	-	-	1	1	-	-	-	-	-	1
Branford	3	-	1	1	-	-	2	-	2	-	-	1	3
Cheshire	4	-	9	-	-	2	4	-	-	-	-	-	1
Chester	1	-	1	1	-	1	1	-	-	-	-	-	1
Clinton	5	1	5	-	2	-	2	-	3	-	-	-	1
Cromwell	3	-	-	-	1	3	1	-	-	-	-	-	1
Deep River	2	1	-	-	1	-	1	-	1	-	-	-	2
Derby	2	-	1	-	-	-	-	-	1	-	-	-	1
Durham	1	-	4	1	1	2	1	3	-	-	-	-	4
East Haven	1	-	-	-	-	-	-	-	-	-	-	-	1
Essex	1	-	1	-	1	4	-	-	1	-	-	-	1
Guilford	4	1	2	-	1	3	-	-	7	-	-	1	3
Haddam	4	1	4	-	-	4	1	-	-	-	-	-	2
Hamden	5	-	2	-	-	1	3	-	-	-	1	-	2
Killingworth	3	1	1	-	1	-	-	-	-	-	-	-	1
Madison	5	-	-	-	1	1	-	-	1	-	-	1	1
Meriden	1	-	3	-	-	3	2	-	-	1	-	4	3

TABLE 4-3 (Cont)
GROUNDWATER DISCHARGES

Municipality	Landfill Site	Transfer Station	Contaminated Well	Leach Field	Septage Lagoon	Wastewater Discharge	Industrial Lagoons	Agricultural Waste	Failing Septic System	Misc.	Cooling Water	Auto Junkyard	Road Salt Storage
Middlefield	3	-	-	-	-	1	-	1	1	1	-	-	1
Middletown	4	-	-	-	-	1	5	-	-	-	-	-	1
Milford	4	-	1	-	-	3	5	-	-	-	-	-	3
Naugatuck	5	-	2	-	-	-	5	-	-	1	-	-	1
New Haven	4	1	-	-	-	1	2	-	2	3	-	5	2
North Branford	3	-	-	-	-	-	1	-	2	4	-	1	1
North Haven	9	-	2	-	1	1	3	-	-	-	-	3	4
Old Saybrook	3	1	-	1	1	1	1	-	2	-	-	-	2
Orange	2	1	1	-	-	-	-	-	-	-	-	-	2
Oxford	1	-	1	-	-	1	-	-	-	-	-	1	1
Portland	2	-	2	-	-	-	1	-	-	-	-	-	1
Prospect	1	-	2	-	-	1	-	-	-	1	-	-	1
Seymour	3	1	1	-	-	-	1	-	-	-	-	-	2
Wallingford	5	-	5	-	-	2	5	3	-	2	-	4	2
Westbrook	2	-	-	-	1	-	-	-	4	-	-	1	3
West Haven	4	-	-	-	-	-	2	-	-	-	-	1	2
Woodbridge	3	-	-	-	-	1	-	-	-	-	-	-	1

Sources:

- Connecticut DEP, Leachate and Wastewater Discharges for the South Central Coast Basin, March 1989
- Connecticut DEP, Leachate and Wastewater Discharges for the Connecticut River Basin, October 1988

TABLE 4-4 (Cont)
SURFACE WATER DISCHARGE

Municipality	Sewage Treatment Plant	Untreated Sewage Discharge	Industrial Wastewaters	Cooling Water	Filter & S&G Backwash	Cooling & Industrial Discharge	Misc.
Middletown	4	-	3	2	1	-	-
Milford	2	-	6	2	-	-	-
Naugatuck	1	-	3	4	-	-	1
New Haven	3	2	4	8	-	-	3
North Branford	-	2	-	-	2	-	4
North Haven	2	-	6	4	1	-	-
Old Saybrook	1	2	-	1	-	-	-
Orange	-	-	-	-	-	-	-
Oxford	-	-	-	-	-	-	-
Portland	2	-	-	-	-	-	-
Prospect	-	-	-	-	-	-	1
Seymour	1	-	1	2	-	-	-
Wallingford	2	-	2	2	2	2	2
Westbrook	-	4	-	-	2	-	-
West Haven	3	-	-	1	-	-	-
Woodbridge	-	-	-	-	1	-	-

Sources:

- Connecticut DEP, Leachate and Wastewater Discharges for the South Central Coast Basin, March 1989
- Connecticut DEP, Leachate and Wastewater Discharges for the Connecticut River Basin, October 1988

TABLE 4-5
INVENTORY OF ADAPTED OR PROPOSED
WATER SUPPLY PROTECTION MECHANISMS

	Watershed Supply			Aquifer Protection		
Community	Special District	General Use Restriction	Required Open Space	Special District	General use Restriction	Required Open Space
Ansonia	-	P	P		P	P
Bethany	-	P/Z	-	-	-	-
Branford	-	Z	Z	-	-	-
Cheshire	-	-	Z	Z	Z	-
Clinton	-	-	P	-	Z	-
Cromwell	-	Z	-	Z	Z	-
Derby	-	P	P	-	P	P
Durham	-	-	-	Z	Z	-
Essex	Z	Z	-	Z	Z	-
Guilford	Z	P/Z	-	-	P	-
Haddam	-	Z	-	Z	Z	-
Hamden	-	-	-	P	P/Z	-
Meriden	Z	-	-	Z	-	-
Middletown	-	-	-	Z	Z	-
Naugatuck	-	-	P	-	-	-
New Haven	-	-	-	-	-	-
North Branford	Z	P	P	-	-	-
North Haven	-	Z	P	Z	Z	P
Orange	-	-	P	-	-	P
Portland	-	Z	-	-	-	-
Prospect	-	Z	-	-	-	-
Seymour	-	P	P	-	P	P
Wallingford	P/Z	P/Z	P	P/Z	P/Z	-
West Haven	-	Z	Z	-	Z	Z

P = Included in Plan of Development
Z = Included in Zoning Regulations

- Protection mechanisms to prevent surface and groundwater contamination

The municipalities within the South Central Area either have, or are in the process, of creating a Plan of Development for their respective communities.

Table 4-6 is a summary list of water supply protection measures that have been proposed, or are in place, as discussed in Plans of Development and Zoning Regulations submitted by the communities in the South Central Area. Note again, that although many of the communities are addressing water supply protection issues, the effort is not as widespread as it should be. This is evident of the fact that the 24 responding towns, only 12 discussed water protection in their Plans of Development and 18 of the respondents deal in some form with water protection within their zoning regulations.

The Connecticut Department of Environmental Protection has recommended various levels of protection for different portions of stratified drift aquifers. In "Protection of High and Moderate Yield Stratified Drift Aquifers," the DEP recommends:

1. Restrictive controls, such as land acquisition, in the relatively small areas immediately around a well field.
2. Stringent controls or protection, such as partial land acquisition and strict regulation, within the larger "drawdown" area of the well field.
3. Less stringent, but still purposeful regulation of land use within the "recharge" areas of the aquifer.
4. Additional regulatory protection to extend upstream within "indirect recharge areas."

There have been several initiatives of the State of Connecticut designed to increase public awareness of the need for water resource protection and to create programs to provide for that protection. During the Spring of 1987, the Connecticut State Legislature formed the Aquifer Protection Task Force. In 1988, this Task Force concluded that the state must develop a comprehensive regulatory framework to protect public water supplies. The Task Force also recommended a statewide mapping effort of stratified drift aquifers. These efforts led to the passage of Public Act 88-324.

TABLE 4-6
WATER SUPPLY PROTECTION MEASURES

Ansonia	- Reservoir and aquifer protection proposed in Plan of Development
	- Plan of Development recommends wetland protection through regulation and prohibiting harmful development
	- Support acquisition and preservation of open space land, especially water company owned land for sale in the future
	- Plan of Development encourages appropriate measures to prevent existing and future problems from storm drainage, solid waste disposal, and water pollution
	- Requests for zoning permits within wetlands and water courses subject to obtaining a permit from the Ansonia Inland Wetlands Agency
Bethany	- Recommend that if water company land becomes available, it be zoned for large lots (minimum 3 acres), or zone it as special zone for watershed use
Branford	- No building or structure shall be within 100 ft of waterline of Lake Saltonstall when waterline is at elevation of 24.0 ft above sea level
	- Provides for Special Use permits to establish Open Space Residential Develop-ment in R-3, R-4, and R-5 residential districts of their type of development would preserve land to conserve natural resources or protect streams, rivers and ponds so as to avoid flooding, erosion, and water pollution
Cheshire	- Open Space land preserved under a cluster subdivision plan to be used: to protect natural streams, ponds, or water supply; for conservation of soils, wetlands, or marshes, and to protect natural drainage systems
	- Zoning code provides for an Aquifer Protection Zone which restricts uses,within the zone, requires permit for any development other than for 1 and 2 family houses
Clinton	- Plan of Development recommends zoning of Passive Open Space areas of limiting natural resources such as Inland Fresh Water Areas, Tidal Saltwater Marshes, Flood Prone Lands and Future Town Forests.
	- Plan of Development recommends zoning of Open Space and lands unsuitable for development such as wetlands, steep slopes, and flood plains.

TABLE 4-6 (Cont)
WATER SUPPLY PROTECTION MEASURES

Clinton (cont.)	- Zoning Commission may require minimum residential lot size of 2 acres in areas lying on an aquifer or recharge area of a public water supply, or within 500 ft of a public water supply reservoir or well.
Cromwell	- Zoning regulations establish Aquifer Protection Zone which imposes regulations on all existing use districts. It coincides with primary and secondary recharge boundaries of the Gardiner well field. There are use restrictions within the zone.
	- Zoning requires a minimum 30 ft set back from a water course for any building in any district.
Derby	- Reservoir and aquifer protection proposed in Plan of Development
	- Recommend in Plan of Development, wetland protection through regulation and prohibiting harmful development
	- Support acquisition and preservation of Open Space land, especially water company owned land for sale in the future.
	- Plan of Development encourages appropriate measures to prevent existing and future problems from storm drainage, solid waste disposal and water pollution.
	- Provisions to be made for storm water management to protect water courses and wetlands from pollution, erosion and sedimentation.
Durham	- Zoning provides for Aquifer Protection Zone which includes primary and secondary recharge zones of aquifers.
	- Aquifer Protection Zones provide for use restrictions and prohibited uses.
Essex	- Zoning provides for a Conservation District with restricted uses.
	- Zoning also provides for Water Resource Districts including the cone of depression of public water supply wells and Water Resource District II including surrounding aquifer material, till, or bedrock to the boundary of the watershed contributing to the cone of depression. These are overlay districts restricting utilization.

TABLE 4-6 (Cont)
WATER SUPPLY PROTECTION MEASURES

Guilford	- Plan of Development recommends policies to fit development of buildings, roads,septic systems, etc., to the capabilities of the natural soils and topography in part, to protect clean waters and manage soil erosion.
	- Plan of Development policies recommend conserving natural resources to avoid damage to present and promising aquifers,protect wetlands, tidal marshes, rivers,water bodies, and water courses from contamination.
	- Comprehensive Plan recommends special land development precautions in lands draining into the Menunkatuck Reservoir and other surface intakes to the New Haven Water Company
	- Comprehensive Plan recommends water company lands be preserved as Conservation Lands and Open Space
	- Zoning regulations establish a Water Supply District for all areas within Guilford, in watersheds of Lake Gaillard, Menunkatuck Reservoir, and intakes for water transmission tunnels to Lake Gaillard, and surface water supplies for the Wallingford Water Company
Haddam	- Haddam zoning regulations establish Aquifer Protection Zones as overlay district to other existing districts with additional requirements,restrictions, and prohibited uses
	- Zoning regulations restrict construction of dwelling units in commercial zones within 100-year flood zone, or areas subject to repeated flooding, to prevent septic system failure and/or contamination of drinking water supplies
	- Zoning requires a 50 ft setback of all structures from a watercress
Hamden	- Plan of Development recommends an Aquifer Protection Zone along the Mill River Corridor, as an overlay district, with additional requirements to existing zoning district regulations
	- Zoning regulations prohibit some land uses within the Aquifer Protection Zone and sets up an APZ permitting process requiring additional information in the site plan i.e. harmful materials, water resources, and supply

TABLE 4-6 (Cont)
WATER SUPPLY PROTECTION MEASURES

Madison	- Zoning provides for a Flood Plain District with no expressed land-use prohibitions
Meriden	- Zoning regulations provide for a Regional Development District requiring an EIR to include existing environmental conditions, environmental impacts, and measures to be taken to minimize impacts
Middletown	- Zoning provides for an Aquifer Protection Zone, an overlay zone with some prohibited uses
	- Zoning provides for stream belt regulations requiring Commission authorization prior to development of alteration. Commission will have specific evaluation criteria to consider for authorization
	- Zoning prohibits new development in floodways, no new development in 100-year flood area, controlled development in 100- to 500-year flood area
Naugatuck	- Objectives of Plan of Development to preserve important natural and physical resources
	- Plan of Development provides for preservation of Open Space in areas of watersheds, wetlands, swamps, stream channels, floodplains, wildlife preserves, forests, and land reservations
	- Utilities section of Plan of Development to protect water supply expanding sanitary sewer system to residential developments of 2+ families per acre, provide channel and build lines along streams, rivers, floodplains, to prevent destruction of a natural water course
	- Zoning establishes Open Space Subdivision plans to protect streams, rivers, and ponds North Branford
	- Plan of Development recommends continued reservation and protection of New Haven Water Co. reservoirs and water supply land as undeveloped Open Space
	- Plan of Development recommends zoning in support of water supply protection
	- Plan of Development suggests single family residential on lots of 1.5+ acres in areas of steep slopes, poor soil conditions, to provide for safe sewage disposal

TABLE 4-6 (Cont)
WATER SUPPLY PROTECTION MEASURES

Naugatuck (cont.)	- Plan of Development recommends administration of subdivision regulations and zoning to preserve streams, swamps,and floodplain areas
	- Zoning provides for a Water Supply District for areas draining into surface reservoirs, placing limitations on land use, requiring a Special Use Permit
	- Zoning provides for a Stream Belt Protection District limiting activities conducted within the district
North Haven	- Plan of Development recognizes the role Open Space preservation to protect streams, wetlands, aquifer recharge areas, etc.
	- Zoning establishes a Stream Buffer Regulation requiring a 50 ft green belt of no development along the Quinnipiac and Muddy Rivers to keep development out of flood prone areas
	- Zoning establishes an Aquifer Protection Zone over recharge areas of designated aquifers. Zone imposes additional regulations of existing land-use zones and prohibits some uses, and requires special permits for others
Oxford	- BHC Aquifer Protection Plan protects Oxford well field.
Orange	- Plan of Development utilization of green space to protect reservoirs, land and streams tributary to surface water supply facilities, land around well sites and over stratified drift aquifers, and and adjacent to water courses and water bodies
Portland	- Zoning provides for a 100 ft set back from a water course unless granted a special permit from the Planning and Zoning Commission and approval of the Portland Inland Wetlands Agency
	- Zoning provides for Connecticut River Assembly review of applications for many land uses within the Connecticut River Assembly Conservation Zone, to protect and improve water quality of the Connecticut River
Prospect	- Zoning requires special permit for use of land designated as inland wetlands
	- Zoning limits use of Floodplain and Flood Hazard Area to protect property and ecological quality of streambelts

TABLE 4-6 (Cont)
WATER SUPPLY PROTECTION MEASURES

Seymour	- Plan of Development proposes reservoir and aquifer protection
	- Plan of Development recommends wetland protection through regulation and prohibiting harmful development
	- Plan supports acquisition and preservation of Open Space Land, especially water company owned land for sale in the future
	- Plan of Development encourages appropriate measures to prevent existing and future problems from storm drainage,solid waste disposal, and water pollution
Wallingford	- Plan of Development provides for protection of major wetland areas and floodplains by encouraging green space land use in those areas
	- Plan of Development provides for Aquifer Districts to restrict uses which present undo risk of groundwater contamination over primary and secondary aquifer recharge areas
	- Plan of Development provides for protection of watersheds by restricting land use to low density residential (2 + acres per family), open space, and appropriate agricultural uses
	- Zoning provides for Aquifer Protection overlay districts over primary and secondary recharge areas of the Quinnipiac and Muddy River aquifers, with regulations and prohibitions in addition to those of underlying districts
	- Zoning establishes 50 ft set backs in single family residential districts and 100 ft set backs in commercial and industrial districts along Quinnipiac and Muddy Rivers. Also, a 25 ft buffer along all other ponds, lakes, streams,brooks, etc.
West Haven	- Zoning regulations provide for open space areas that are undeveloped, or developed to preserve and protect natural resources and the environment, including a 25 ft set back from any structure.
	- Zoning provides for a minimum of a 25 ft set back from any wetland or water course in all districts

Public Act 88-324, an act requiring aquifer mapping, states that private, municipal, and regional water utilities must map certain aquifers to provide the necessary information to guide the state and municipalities in decisions regarding groundwater protection measures. This act requires two levels of mapping. The first, Level B mapping, must be submitted to the DEP by July 1, 1990. This mapping effort is designed to be an initial cursory examination that can be produced quickly and inexpensively utilizing existing information. Level B mapping is to provide preliminary estimates of the extent of the stratified drift aquifer, its hydraulic characteristics, and the initial setback area as determined from discharge versus transmissivity calculations.

On or before July 1, 1992, each water utility serving ten thousand or more persons, shall submit to the DEP, Level A mapping on all its existing well fields located within its water supply area. Although the final guidelines for Level A mapping have not yet been determined, this effort will require a long-term pumping test and computer simulation of aquifer performance under specified pumping and recharge conditions.

The information derived from these mapping efforts will indicate in which areas municipalities must inventory and map current land uses. This inventory will then serve as the basis for defining appropriate land-use regulations over stratified drift aquifers and designing groundwater protection programs.

During 1988, the Aquifer Protection Task Force concentrated its efforts on designing the regulatory framework for protection of the most sensitive aquifer areas identified through the mapping process. The Report of the Aquifer Protection Task Force, February 15, 1989, provides specific recommendations for establishing organizational and regulatory guidelines regarding aquifer protection. This Task Force recommends that the DEP be authorized to accomplish the following major tasks:

- Develop regulations and performance standards for existing and future land uses to be implemented by municipalities in aquifer protection areas.
- Develop, in conjunction with DOHS, a statewide education program on groundwater protection.
- Develop, in conjunction with DOHS and water utilities, a program for technical assistance to other entities in implementing all aspects of the aquifer protection program.

- Develop, in conjunction with DOHS, utilities, and the regulatory community, a groundwater monitoring program to be implemented within 1 year of completion of the Level A mapping effort.
- Develop a model aquifer protection ordinance.
- Direct farms within aquifer protection areas to develop and implement Farm Resource Management Plans.
- Work with the Department of Transportation to develop protection programs for public supply wells located near state highways and roads.
- Develop a positive incentive program for successful efforts promoting water resource protection.
- Develop, in conjunction with DOHS and DPUC, guidelines for land acquisition around existing and proposed water supply wells, and encourage such acquisition.

The Task Force also presented a number of additional recommendations. Major requirements of these recommendations are as follows:

- Require that municipalities designate aquifer protection areas and adopt regulations meeting minimum state guidelines.
- Municipalities must notify utilities of pending land-use applications within an aquifer protection area.
- Require that utilities map future stratified drift water supplies upon approval of individual water supply plans.
- Require that DEP and other government agencies give aquifer protection a high priority in ongoing programs.
- Require that municipalities complete land-use inventories within 1 year of receipt of approved Level B maps.
- Require that municipalities having a present or proposed source of water supply from a stratified drift aquifer, designate one individual to receive training on aquifer protection.
- Require agricultural cost-sharing programs and develop individual resource management plans.
- Authorize utilities to explore state-owned lands to determine the potential for future public water supply sources.

Recommendations set forth in the above-mentioned Task Force Report were incorporated in subsequently passed legislation. Public Act 89-305, Aquifer Protection and Flood and Erosion Control, provides the regulatory

framework to establish effective aquifer protection programs. It requires that individual communities become involved with establishing and administering the programs.

C. COMMUNITY ZONING AND LAND-USE REGULATIONS

Where a Plan of Development deals with intent and future actions regarding water supply protection, it is through the municipalities' zoning regulations that protection will actually occur. Zoning regulations are established to control new development within a community. Initially, a community needs to establish the level of protection necessary for their existing and potential water supplies. Zoning and other regulatory mechanisms can be then enacted to provide that protection.

Since municipal zoning codes were established long before the state and communities became aware of the finite and sensitive nature of water resources and the need for their protection, revisions need to be made to existing codes. These revisions which are designed for water supply protection, should generally involve prohibiting, or severely restricting land uses identified as posing significant risk to the quality of surface and groundwater supplies. If water supply protection indicates that certain high risk industrial and commercial activities should be excluded from certain areas, then other areas having less environmental sensitivity should be identified and zoned for these uses.

The above process is very effective and relatively easy to use in newly developing areas. The issue of water resource protection through zoning is more complex in sensitive areas where previous zoning permitted high risk land uses. State of Connecticut guidelines now suggest that zoning regulations include provisions stating that in the event of re-occupancy of an existing facility, the new use should be in conformance with present zoning (which allow for water supply protection), rather than previous zoning created when water resource protection was not considered.

Table 4-6, as already stated, presents a summary of water supply protection measures, either currently in effect or recommended within Plans of Development. This table demonstrates that there is little regulatory consistency among communities. It also shows that some communities are quite advanced in their planning, while others have not yet started to seriously consider water resource protection. Where some communities have recognized the need for protection in their Plans of Development,

regulations have not yet been established in their zoning codes. In addition, some of the communities are still in the process of drafting their Plans of Development, and it could be some time before effective protection mechanisms will be formalized in their zoning regulations.

As has been discussed in other portions of this Integrated Report, the South Central Connecticut Area has a large number of small water supply utilities that were formed to serve only small residential housing developments, multifamily developments, trailer parks, etc. The report has also demonstrated that frequently these small organizations have had problems maintaining quality service due to shortages in supply, financial resources, management systems, etc. Communities should develop regulatory mechanisms which would discourage the continued proliferation of these small entities. Criteria for new construction or expansion of water supply systems were provided under Public Act 84-330. These criteria include:

- Information demonstrating the new service area cannot be served by existing systems
- A design which is in accordance with acceptable engineering standards
- Information demonstrating that existing services or capacity are not duplicated
- Proof that the water supply company servicing it is capable of operating the utility efficiently and reliably
- A demonstration that all federal and state water quality standards have been met

The above act requires that a certificate be issued by DPUC to the water supply company before seeking approval from a planning commission, or combined planning and zoning commission to begin operation. If a community approves operation of the company without the necessary DPUC certificate, the community becomes responsible for ensuring adequate water supply should the company fail to do so for any reason.

A review of the subdivision regulations contained within the zoning codes indicates that many of the communities have not adequately addressed the question of water supply in new development areas. This failure has been, in part, responsible for the numerous small operators supplying water, many of whom are having difficulties.

Since there is a large number of zoning codes used by the different communities, an attempt to compare them becomes confusing. However, Table 4-7 lists the zoning categories for each of the responding communities. This table also normalizes all of the zoning codes by comparing them to a system of classification developed by the consulting firm of Haven & Emerson, Inc. This simplified zoning classification system is listed below:

RH - High Density Residential Zoning

- 0-39,990 sq ft per dwelling unit
- Mobile Homes
- Planned residential development 0-39,990 sq ft per dwelling unit
- Planned residential development

RL - Low Density Residential Zoning
- Greater than or equal to 40,000 sq ft per dwelling unit
- Planned residential development - greater than 40,000 sq ft

M - Multiple Family Residential Zoning
- Apartments, condominiums, etc.

C - Commercial Zoning
- Includes planned commercial development

I - Industrial Zoning
- Includes planned industrial development

A - Agricultural Zoning

O - Open Space (A Category)
- Includes floodplains, parks, reserves, and other dedicated open space

Several of the communities have some form of Aquifer Protection Zone to protect groundwater resources. Usually this zone takes the form of an "overlay" zone that is superimposed over the existing zoning districts. As such, additional regulations are added to the standard regulations of the underlying zoning district. Generally, there is a limited list of land uses that are prohibited within the Aquifer Protection Zone, regardless of the regulations of the underlying zoning district. These prohibitions are usually restricted to activities such as: solid waste disposal, road salt storage, underground fuel tanks, hazardous waste storage and disposal, open manure piles, and septage lagoons. However, the list of prohibited land

TABLE 4-7
ZONING CATEGORIES WITH
CORRESPONDING TOWN ZONE DESIGNATIONS

Town	RH	RL	M	C	I	A	O
Ansonia	AA A B		GA MM BB RR	NR SC	LI HI		
Bethany		R-130 R-6S			B-1		
Branford	R-1 R-2 R-3 R-4	R-5		BC BR BL CP	IG-1 IG-2		
Cheshire	R-20 R-20A	R-80 R-40		C-1 C-2 C-3	I-1 I-2		
Clinton	R-10 R-15 R-20 R-30 VRD	R-80 R-40		B-1A B-1B B-2 B-3 B-4 IP	I-1 I-2 M-1 M-2		
Cromwell	A-15 A-25	A-40	PRO-1 PRO-2	B PO	I IP		
Derby	R-5 R-10 R-15 R-20			P C-1 C-2 C-3 CBD	I-1 I-2 I-3		
Durham	MR	FR		C-1 C-2	HID LI		
Essex	VR	RU RLC	RM	EV WF C	LI	CONS	

TABLE 4-7 (Cont)
ZONING CATEGORIES WITH
CORRESPONDING TOWN ZONE DESIGNATIONS

Town	RH	RL	M	C	I	A	O
Guilford	R-1 R-2 R-3 R-4	R-5 R-6 R-7 R-8		C-1 C-2 C-3 C-4 C-2M MR-1 C-D	I-1 I-2		
Haddam	R-1/2	R-1 R-2		C	I IPD		
Hamden	R-3 R-4 R-5	R-1 R-2		B-1 B-2 CDD-1 CDD-2 CDD-3 CDD-4	M-1		
Madison		R-1 R-2 RU-1 RU-2		CA-1 CA-2 CB-1 CB-2 S RS	LI		
Meriden	S-R R-1 R-2 PRD	R-R S-R R-1	R-3 R-4	C-1 C-2 C-3 C-4 PEOD RDD	M-1 M-2 M-3 M-4		
Middletown	R-30 R-15	R-45 R-60	M MX	B-1 B-2 IOP RF ID IT	I-1 I-2 I-3 IRA		PL

TABLE 4-7 (Cont)
ZONING CATEGORIES WITH
CORRESPONDING TOWN ZONE DESIGNATIONS

Town	RH	RL	M	C	I	A	O
Naugatuck	R-8 R-15 R-30		RA-1 RA-2 RO	B-2 B-2 B-3	I-1 I-2 PDD		
New Haven	RS-1 RS-2		RH-1 RH-2 RO RM-1 RH-2	B-A B-B B-C B-D B-E	I-L I-H AD		PD
North Branford		R-40 R-80	R-GA	B-1 B-2 B-3	I-1 I-2 I-3		
N. Haven	R-20 R-12 EH	R-40	RA-40 RA-20 RA-12 OA	O LO LC CN-20 CA-20 CB-20 CB-40	IL-30 IL-80 IG-80		
Orange		RES		C-1 C-2 CP CP BOP	LI-1 LI-2		
Portland	R-25 R-15 R-10	RR	RMD	B-1 B-2 B-3	I IP ISM		
Prospect		RA-1 RA-2		CG CD	IND		
Seymour		R-6S R-40 R-15	TH GA	CBD C RC	LI GI		

TABLE 4-7 (Cont)
ZONING CATEGORIES WITH
CORRESPONDING TOWN ZONE DESIGNATIONS

Town	RH	RL	M	C	I	A	O
West Haven	R-1 R-2 R3-1 R3-2 RPD		R-4 R-5 R-6 CFPD	C-1 C-2 C-3 C-4 C-5 CPD R-CPO	M-1 M-2 M-3 IPO C-IPD		OS SS
Wallingford	R-18 R-15 R-11 R-6	RU-160 RU-120 RU-80 RU-40	RM-40 RM-11 RM-6 DA	LB-11 CA-40 CA-12 CA-6 CB-40 CB-12	I-40 I-20 IX		

uses is generally quite limited. Since the majority of land uses would be subject to the regulations of the underlying zoning district, it is possible for high risk uses, which are not covered in the prohibited use list, to be permitted over the aquifer. Many of the communities attempt to control this by making many of these other uses subject to special permit. Although this controlling effort helps to limit high risk land uses, standards being applied for the decisions are likely to be inconsistent. The list of potentially dangerous and prohibited land uses should be greatly expanded to include those omitted, high risk uses, to increase protection of the water resource, and to standardize the decision-making process.

Many of the communities have regulations which, although are not originally designed as part of a water resource protection program, do contribute to water protection. For example, most of the communities have performance standards, such as a prohibition of discharge of hazardous waste into any waterway. Flood protection zones, although established to limit property damage and loss of life, frequently have regulations which benefit water quality, as well; some limit land uses within the floodplain, others deal with design standards of utilities in the area. In addition, most communities have standards for construction and soil removal to prevent siltation of surface water bodies, which also benefit water quality.

Communities should recognize the threats to water quality posed by transportation networks overlying aquifers and running adjacent to surface water bodies. Road salting practices and the associated salt storage are a threat to the environment. Hazardous materials are frequently transported on local highways creating the potential for accidents and spills. Recently, most communities have been establishing some form of emergency response plan. The Superfund Amendment and Reauthorization Act (SARA) now requires that towns update their emergency response procedures. These procedures are then to be included in the water supply plan of each utility.

D. CONFLICTING LAND USE AND WATER SUPPLY NEEDS

Discussed earlier were the various zoning categories within the communities in the South Central Area. It is necessary to view each of these categories in light of the environmental risk each represents to water resources. Within "Protection of High and Moderate Yield Stratified

Drift Aquifers," the Connecticut Department of Environmental Protection presents a classification of land uses and levels of risk presented by each. These classifications are defined as follows:

1. Category A - Land uses which provide maximum protection to high and moderate yield aquifers including:

   - Water utility owned and maintained land
   - Designated open space, passive recreation with no permanent facilities
   - State or local government-owned forest land
   - Managed forest land, privately owned
   - Developed recreation land use, public parks (excluding active recreational areas such as golf courses)

2. Category B - Land uses posing minimal risks to high and moderate yield aquifers, including:

   - Field crops - permanent pasture, hay crops, corn and vegetable production
   - Low density residential and certain institutional uses (density of less that one dwelling per two acres)

3. Category C - Land uses which pose slight to moderate risks to groundwater, including:

   - Agricultural production (livestock, tobacco crops, nurseries, and orchards)
   - Golf courses
   - Medium density residential (one dwelling per one-half to two acres)

4. Category D - Land uses considered to pose substantial risk to groundwater, including:

   - Institutional use (schools, colleges, hospitals, nursing homes, prisons)
   - High density housing (greater than one dwelling per one-half acre)
   - Certain commercial uses (conventional office buildings not including "professional" office or retail activity; banks, restaurants and other stable, domestic sewage limited uses

5. Category E - Land uses which pose a major threat should be banned in drawdown areas and banned or strictly regulated in recharge areas, including:

   - Retail commercial development (discharges limited to domestic sewage)
   - Commercial uses with chemical wastes in addition to domestic sewage as a result of services offered by (1) professional offices, medical, veterinary, etc. (2) commercial retail processors, furniture strippers, dry cleaners, photo processors, beauty shops, appliance repairs, etc. (3) auto body shops, service stations, machine shops, junk yards, etc., and (4) industrial uses, manufacturing, processing, research and storage facilities, all of which have the potential to cause contamination.

Although the above classification was devised in reference to groundwater, it may be considered valid for surface water resources also. Contaminated groundwater frequently discharges into surface water bodies. Contamination flowing overland into surface streams etc., will also ultimately reach water utility intake structures.

Table 4-8 demonstrates the risk category within which each of the community zoning districts fall. The permitted uses for all of the districts were reviewed; then, they were matched with the appropriate risk category. Low and medium density residential zones can fall into Risk Categories A through C, depending upon the amount of acreage zoned. In Table 4-8, Risk Category A-C reflects this range of risk categories as a result of acreage included in each zoning designation. This table shows that the vast majority of the zoning districts fall within Risk Category D, substantial risk, and Risk Category E, major threat to groundwater. This relationship indicates that there exists substantial competition for higher risk land uses with water resource protection. As mentioned earlier, historically it was practical for commercial and industrial activities to be located along water courses. The maps presented in Figures 4-1 and 4-2 show that frequently stratified drift aquifers underlie watershed areas; therefore, development along major waterways often poses a threat to both surface and groundwater resources.

In areas where high risk development has already occurred, little can be currently done until a land use that requires a new zoning approval is requested. Until that time, however, municipalities can attempt to identify the degree of risk posed by existing activities and create

TABLE 4-8
COMPARISON OF DEP RISK CATEGORIES
WITH TOWN ZONING DISTRICTS

Town	Risk Categories A	A-C	B	C	D	E
Ansonia					AA A B GA MM BB NR RR	C SC LI HI
Bethany		R-130 R-65				B-1
Branford		R-5			R-1 R-2 R-3 R-4 RM-1 BR CP	BC IG-1 IG-2
Cheshire		R-80 R-40			R-20 R-20A C-1	C-2 C-3 I-1 I-2
Clinton		R-80 R-40			R-10 R-15 R-20 R-30 VRD IP	B-IA M-1 B-1B M-2 B-2 I-1 B-3 I-2 B-4
Cromwell	FPD	A-40			A-15 A-25 PRD-1 PRD-2 PO	B I IP
Derby				R-5 R-10 R-15 R-20	RM P I-Z	

TABLE 4-8 (Cont)
COMPARISON OF DEP RISK CATEGORIES
WITH TOWN ZONING DISTRICTS

Town	Risk Categories A	A-C	B	C	D	E
Durham					MR FR	C-1 C-2 HID LI
Essex	CONS			RR RM RLC	VR	EV WF C LI WRD
Guilford					R-1 R-2 R-3 R-4 R-5 R-6 R-7 R-8	RS-1	C-1 C-2 C-3 C-4 C-2M MR-1	I-1 I-2 C-D
Haddam		R-1 R-2		R-1/2		C I IPD
Hamden		R-1 R-2		R-3		R-4 R-5	B-1 B-2 CDD-1 CDD-2	CDD-3 CDD-4 M-1
Madison		R-1 R-2 RU-1 RU-2					CA-1 CA-2 CB-1 CB-2	S RS LI
Meriden		R-R S-R R-1			S-R R-1 R-2 PRD	R-3 R-4 PEOD	C-1 C-2 C-3 C-4 M-1	M-2 M-3 M-4 PRD RDD
Middletown				R-30 R-45 R-60	R-15 M MX IOP ID		B-1 B-2 RF IT	I-1 I-2 I-3 IRA

TABLE 4-8 (Cont)
COMPARISON OF DEP RISK CATEGORIES
WITH TOWN ZONING DISTRICTS

Town	Risk Categories								
	A	A-C	B	C	D			E	
Naugatuck				R-30	R-15 R-8 RA-1	RA-2 RO	B-1 B-2 B-3	I-1 I-2 PDD
New Haven	PD				RS-1 RS-2 RH-1 RH-2	RM-1 RM-2	B-A B-B B-C B-D	B-E I-L I-H A-D
N. Branford				R-40 R-80		R-GA	B-1 B-2 B-3	I-1 I-2 I-3
N. Haven			R-20 R-40 RA-40	RA-20 RA-12	OA O LO	CN-20 RH-12 EH LC	CN-20 CB-20 CB-40	IL-30 IL-80 IG-80
Orange		RES				OP	C-1 C-2 LSC	BOP LI-1 LI-2
Portland				RP R-25	R-15 R-10 RMD		B-1 B-2 B-3	I IP ISM
Prospect				RA-1 RA-2			CG CD IND	
Seymour				R-6S R-40		R-15 TH GA	CBD RC C	LI GI
West Haven				OS	R-1 R-2 R3-1 R3-2 RPD	R-4 R-5 R-6 CFPD	C-1 C-2 C-3 C-4 C-5 CPD RCPD	M-1 M-2 M-3 IPD C-IPD SS

TABLE 4-8 (Cont)
COMPARISON OF DEP RISK CATEGORIES
WITH TOWN ZONING DISTRICTS

Town	Risk Categories							
	A	A-C	B	C	D		E	
Wallingford					R-18	RM-6		
		RU-160			R-15	DA	LB-11	I-40
		RU-120			R-11		CA-40	I-20
		RU-80			R-6		CA-12	IX
		RU-40			RM-40		CA-6	
					RM-11		CB-40	
							CB-12	

regulations to control the use of hazardous materials and protect the nearby water resources. For areas currently zoned for high risk land uses, but within which there has been no development, the municipalities have the opportunity to assess the risks and rezone to provide greater water resource protection. Municipalities may choose to create regulation types of land use without rezoning. For example, within industrial areas near water resources, activities which generate liquid industrial waste and, therefore, pose a higher risk of water contamination, could be restricted while those that do not would be permitted.

Through zoning regulations and plans of development, municipalities should either foster development at densities which facilitate the use of traditional water and sewer facilities, or encourage development at a density whereby only on-lot systems would be necessary. Exclusive service areas should be designated to include areas planned for higher densities. Municipalities should ensure permanent on-lot water, and septic systems should occur for both the areas outside of a utilities exclusive service area and those portions of an exclusive service area where protection of a resource, such as a public water supply is essential. The object would be to avoid development at an in-between level which may, over time, require the provision of water and/or sewer services to areas of scattered development. These services may then encourage additional development which can be detrimental to sound planning and the protection of ground and surface water resources. Furthermore, the cumulative effects of incremental growth on a water supply source should be taken into consideration on a municipality's planning programs and regulations.

Before such judgements can be made, those charged with administering zoning regulations need to become knowledgeable of those industries posing the greatest degree of risk to surface and groundwater. This implies that those individuals become educated about the areas in their community containing water resources and the industries, and processes that significantly threaten the resource.

This education process can be better achieved if representatives of local water supply utilities become involved with the communities planning and zoning process. The input from these water supply professionals would help ensure that the water protection perspective would always be represented.

The section of the Integrated Report dealing with alternative water supplies, identifies potential future water resources to be utilized. The time to ensure protection of these future supplies is now, not later, when these resources are to be brought on-line to meet increased demand. If the protection effort is delayed, some of these water reserves may be contaminated and eliminated as a supply option, or may be used only after costly remedial efforts. Therefore, members of the planning and zoning boards need to know of these potential future water supplies and the planning for their utilization.

Conclusions

Only recently have communities become sensitive to issues dealing with protection of water supply resources. Therefore, protection measures are now beginning to be incorporated within Plans of Development and Zoning Regulations. However, the degree to which individual communities actively protect the resource is quite variable, with some being quite advanced in their programs while others have not yet started. Generally speaking, communities have not yet taken sufficient steps to ensure water resource protection.

Appropriate water resource protection zones must be established to ensure long-term water quality for public water supply. All members of municipal planning and zoning commissions must be educated and made aware of the critical importance of water resource protection so they will implement proper regulations. For a successful protection program, all facets of the community must be involved.

Public Act 89-305 requires that each community designate an agency to be responsible for aquifer protection. Not later than 6 months after DEP approval of Level A mapping, this agency shall adapt appropriate regulations for aquifer protection. As discussed earlier, surface and groundwaters are interrelated and contamination of one frequently leads to the contamination of the other. Therefore, this WUCC recommends that the municipal aquifer protection agency also be responsible for protection of surface water resources.

Surface and groundwater resources frequently cross town boundaries. Towns may contain water resources that are used as a potable water supply for end users within other communities. Therefore, municipalities must give equal attention to protection of these resources as they would to their own. Public Act 89-305 provides for an incentive program to provide

public recognition of users of land who demonstrate committed and successful efforts to implement innovative approaches to groundwater protection. This incentive program should be expanded to include innovative approaches to surface water protection. It is the position of this WUCC that it has a mandate to provide water service to meet public demands. Utilities, both private and public, do not have the authority to limit growth in a municipality. It is the role of each town, within its Plan of Development, to assess local resource needs, source availability, and consumer demands. Utilities are urged to encourage each town within their respective service areas to take steps to protect resources and limit growth in water demand if resource availability is limited. Utilities are also encouraged to continue working with towns to help ensure that water resources to be utilized for nonlocal use will receive the same protection attention that would be given to those sources designated for local consumption.

For water resource protection programs to be effective, municipalities should be involved in regional protection planning efforts. The WUCC recognizes that issues involving water resource planning and protection are regional in nature. As mentioned above, aquifer and watershed boundaries frequently cross municipal boundaries and public water sources are not always located within the same municipality as the ultimate downstream consumers of water from those sources. Therefore, the WUCC welcomes and encourages municipal input to the planning process.

Due to the regional nature of water resources and related planning efforts, this WUCC believes that the regional planning organizations are the most appropriate forum through which municipal contributions can be made. Through these regional planning organizations, local concerns may be expressed, input to the planning effort can be made, and local town planning and water resource protection efforts can be coordinated.

The WUCC strongly believes that in the future, municipalities must address water supply issues more on a regional basis, rather than on a local basis, as has been the common practice in the past. The regional planning organizations offer the best mechanism for such a regional approach to planning.

Water resource protection regulations, to be formulated by the municipal aquifer protection agency as required by Public Act 89-305, will entail restrictions of allowable land-use activities permitted within

designated aquifer protection areas. The DEP has developed a Hierarchy of Land Uses which ranks land-use categories by their respective risks to water quality. The South Central WUCC believes that achieving compatible land uses is crucial to maintaining the long-term viability of potable water sources. Therefore, the WUCC recommends the following:

- Existing high and moderate risk land uses be carefully monitored by utilities and municipalities. Further expansion of such land uses should be restricted within water resource protection areas.
- Further new moderate and high risk development and land uses be prohibited within the designated protection areas. Watershed and aquifer protection areas should be rezoned and placed into either the "low risk open space" or "low density residential category."
- A protective overlay district, which restricts land uses and activities should be created for all aquifers and watersheds that are current or possible future sources of public water supply.
- All water purveyors should work closely with municipalities in achieving water resource protection.

Public Act 89-305 stipulates that the DEP, in conjunction with DOHS and the DPUC, will develop guidelines for the acquisition of lands that surround existing or proposed public water supply well fields. This WUCC believes that public water supply is the highest use possible for a water resource and therefore, recommends that water supply protection be given the highest priority by these agencies in formulating these guidelines and future land acquisition programs. The WUCC suggests that similar guidelines and land acquisition programs be established for surface water resources that are identified as existing or proposed future sources of public water supply.

Individual communities should be encouraged to establish committees to develop appropriate protection programs. Representatives from water supply utilities should be part of these committees and become involved in the protection program development.

Communities should work closely with industry to identify potentially hazardous threats to the water resource, and ensure that proper procedures for handling those materials are in place and practiced. The communities need to be sure that emergency response procedures to handle accidents and spills have been developed.

Since a successful resource protection program should involve all segments of the community, the consuming public should be educated of the importance of water supply protection to elicit their support. Planning and zoning commissions need to be sufficiently educated to establish appropriate resource boundaries, design protection measures, and implement them. Without involvement and commitment of the commissioners, the public, the utilities, and the industry, successful protection of surface and groundwater supplies becomes questionable.

V. INTERCONNECTION ANALYSIS

A. INTRODUCTION

In accordance with the Connecticut Regulations Concerning Coordinated Water System Plans, the South Central Water Utility Coordinating Committee (WUCC) has prepared the following analysis of interconnections, to be included in part three of the areawide supplement, the Integrated Report. This analysis includes the review and tabulation of existing and proposed interconnections, the legal, technical, and financial considerations involved in interconnection use, and an assessment of the need for potential development of new interconnections.

B. SYSTEM INTERCONNECTIONS, CONCEPTS, AND CRITERIA

1. CONCEPTS

An interconnection, for the purposes of this report, is defined as a physical connection between two water utilities with the intention of interchanging water for regular or intermittent use. The functions of interconnections generally are grouped into three main categories:

a. Continuous (daily use) where one utility supplies another on a daily basis. The water transferred is frequently used as another source by the receiving utility.
b. Intermittent use for the transfer of water on an emergency basis.
c. Guaranteed supply to supplement safe yield on a necessity basis.

Continuous or daily-use interconnections involve the transfer of water for an extended time period. The receiving utility uses these interconnections until new sources are developed, or as a long-term source or supply. Daily-use interconnections can involve varying quantities of water ranging from a fraction to 100 percent of the receiving utility's demand. Continuous interconnections should, and often do, involve written agreements which specify the terms of the sale of the water, the contract period, and the maintenance responsibilities.

Intermittent-use interconnections involve the transfer of water for short- or long-term emergency backup purposes. Agreements between connecting systems are typically nonspecific, as circumstances for use can vary; however, it should be made clear who is responsible for maintenance.

Guaranteed-supply interconnections function as short- or long-term supplements to the existing safe yield of other sources. This type of interconnection is not used on a continuous basis; however, agreements are often required as each utility's safe yield is impacted by the interconnection.

Interconnections can and should (where feasible), play a role in the area's water supply picture. When two or more utilities are located within close proximity of each other, an interconnection may offer a cost-effective solution to the development of an alternative supply source. However, as the distance between two utilities increases, the cost of an interconnection can become prohibitive. This expense must be weighed on a case-by-case basis by the utilities involved and balanced against the cost of developing a new supply.

The concept of interconnections is further enumerated with regard to small utilities in the DPUC regulations regarding Application Procedures and Criteria for Issuing Certificates of Public Convenience and Necessity for Small Water Companies, (Docket No. 84-09-18). These regulations define "feasible interconnections" as follows:

> "... the extension of an existing utility's water mains is considered feasible to serve a proposed project with at least fifteen service connections or twenty-five persons if the developer's investment for such extension, including service connections and appurtenances, is less than $5,000 (construction costs only) per dwelling or office unit and if there is sufficient supply and storage facilities to accommodate the anticipated demand available from the existing utility. If there is insufficient supply and storage available from the existing utility, the cost of developing such facilities may be included in the water main extension proposal, as additional items."

2. CRITERIA

The basic criteria for typical interconnections are as follows:

- Physical interconnection between the two systems using piping adequately sized to transmit the water required at the differential pressure concerned.
- Rugged meter(s) sized to suit the anticipated flow, including isolating valves.
- Flexible coupling to permit removal of pipes or meter(s), if required.

- Bypass for emergency use to allow the interconnection to be used at times when the meter is out of service.
- Taps on each side of the meter isolating valves to check pressures prior to use and to empty pipes to facilitate dismantling for meter(s) servicing/calibration.
- Hydrants nearby for use in testing for water sampling, flushing, and flow measurement.
- An optional meter pit enclosing the meter body and the two tappings at a minimum and, if possible, all pipework and thrust restraints.

C. ISSUES RELATING TO THE DEVELOPMENT OF INTERCONNECTIONS

Prior to the installation of an interconnection, the advantages and disadvantages of a connection should be considered. Two adjacent systems considering implementing an interconnection should first examine the reliability of the backup source, the compatibility of the two systems in terms of water quality and system pressure, the financial and legal considerations, the feasibility of alternatives, and the overall water supply objectives. Some of the advantages and disadvantages of system interconnections are listed below:

Advantages

- Interconnections can provide a readily available backup source for augmenting supply at times of emergency or peak demand.
- Interconnections may be less expensive than developing additional sources, treatment, or standby power for emergency use.
- Interconnections between utilities of similar size can provide emergency service to both.
- Regular interconnections may defer or eliminate the need to develop additional sources.
- Interconnections can improve water quality by replacing sources of inferior quality.
- Interconnections can provide supply in areas where source development is not feasible.
- Interconnections can improve reliability for systems that are subject to seasonal fluctuations in available supply.

Disadvantages

- Regular interconnections must be maintained and the meters calibrated.
- Water quality difference between the systems may be noticeable to consumers, especially for interconnections not used on a regular basis.
- Interconnections for emergency use must be flushed prior to activation.
- Access and maintenance of emergency interconnections must be kept up so that they are operational when needed.
- Long distances between utilities can make interconnections expensive.
- Drought or other emergency conditions can affect both utilities so that supply is not available when needed.
- Pressure differences between systems may require pumping or pressure reducing valves.
- Interconnections are frequently located at the fringes of the distribution systems and may be small diameter pipes with limited capacities.
- Diversion permit application process may be required.

D. EXISTING INTERCONNECTIONS WITHIN SOUTH CENTRAL MANAGEMENT AREA

1. Systems Serving More Than 1,000 People

Interconnections currently play a significant role in providing water to many large systems in the South Central Area. Tables 5-1 through 5-5 summarize the continuous and emergency system interconnections existing in the South Central Area.

[redacted]

TABLE 5-1
ANSONIA DERBY WATER COMPANY (ADWCo)
EXISTING INTERCONNECTIONS

	[redacted]
Date Completed	
Direction of Flow	
Length	
Material	
Pipe Diameter	
Treated	
Town (from)	
Location	
Service Area (To)	
Storage	
Pump Capacity	
Flow Line Elev.	
Avail. Capacity	
Min. Yearly	
Min. Monthly	

*South Central Connect
1-5 See footnotes at the end of this table.

TABLE 5-1 (Cont)
ANSONIA DERBY WATER COMPANY (ADWCo)
EXISTING INTERCONNECTIONS

	Purchased Water	Sales of Water
Min. Ave. Flow	[redacted]	
Min. Peak Flow		
Max. Flow		
Length of Contra		
Expiration Date		
Renewal Option		
Whose Option		
Renewal Period		
Sale of Excess Water Permit		

6-7 See footnotes at the end of this table.

TABLE 5-1 (Cont)
ANSONIA DERBY WATER COMPANY (ADWCo)
EXISTING INTERCONNECTIONS

TABLE 5-2
BRIDGEPORT HYDRAULIC COMPANY (BHC)
VALLEY DIVISION
EXISTING INTERCONNECTIONS

	[redacted]
Date Completed	
Direction of Flow	
Length	
Material	
Pipe Diameter	
Treated	
Location	
Storage	
Pump Capacity	
Avail. Capacity	
Min. Yearly	
Min. Monthly	
Min. Ave. Flow	
Max. Flow	
Length of Contract	

TABLE 5-2 (Cont)
BRIDGEPORT HYDRAULIC COMPANY (BHC)
VALLEY DIVISION
EXISTING INTERCONNECTIONS

	[redacted]
Expiration/Renewal Date	
Renewal Date	
Status	
NOTES:	

Source of Information: Connecticut Department of Health Services, Interconnection Summaries, 1987

TABLE 5-3
CROMWELL FIRE DISTRICT
EXISTING INTERCONNECTIONS

	[redacted]
Direction of Flow	
Date Completed	
Length	
Material	
Pipe Diameter	
Treated	
Location	
Storage	
Max. Flow	
Average Rate	
Length of Contract	
Expiration Date	

TABLE 5-3 (Cont)
CROMWELL FIRE DISTRICT
EXISTING INTERCONNECTIONS

	[redacted]
Status	
Priority	
NOTES	

Source of Information: Connecticut Department of Health Services, Interconnection Summaries, 1987

TABLE 5-4
SOUTH CENTRAL CONNECTICUT REGIONAL WATER
AUTHORITY (SCCRWA)
EXISTING INTERCONNECTIONS

[redacted]

Date Completed	
Direction of F	
Length	
Material	
Pipe Diameter	
Treated	
Location	
Service Area (	
Storage	
Pump Capacity	

[1] See footnote at the end of this table.

TABLE 5-4 (Cont)
SOUTH CENTRAL CONNECTICUT REGIONAL WATER
AUTHORITY (SCCRWA)
EXISTING INTERCONNECTIONS

[redacted]

Flow Line Elev.	
Avail. Capacity	
Min. Yearly	
Min. Ave. Flow	
Min. Peak Flow	
Max. Flow	
Min. Monthly	
Length of Contra	
Date of Expirati Renewal	
Whose Option	
Renewal Period	

[1] See footnote at the end of this table.

TABLE 5-4 (Cont)
SOUTH CENTRAL CONNECTICUT REGIONAL WATER
AUTHORITY (SCCRWA)
EXISTING INTERCONNECTIONS

	[redacted]
Sale of Excess Water Permit	
Priority for Use Sales Restrictions	
Status	

N/A = Not Applicable

Source of Information: Connecticut Department of Health Services, Interconnection Summaries, 1987

[redacted]ny

TABLE 5-5
WALLINGFORD WATER DIVISION
EXISTING INTERCONNECTIONS

	[redacted]
Date Completed	
Direction of Flow	
Pipe Diameter	
Treated	
Location	
Avail. Capacity	
Min. Ave. Flow	
Max. Flow	
Length of Contract	
Expiration Date	
Status	

NOTE: Additional pumping needed to alleviate existing hydraulic problem if continuous flow is to be developed.

Source of Information: Connecticut Department of Health Services, Interconnection Summaries, 1987

SCCRWA is the principal provider of water to utilities in the South Central Area through [redacted] that provide water [redacted]

2. Systems Serving Less Than 1,000 People

The majority of public water supply systems in the South Central Area currently do not service more than 1,000 people. The Derby Water Department receives 100 percent of its supply from an unlimited interconnection with the Ansonia Derby Water Company.

[redacted]

its own groundwater supplies, a service connection with the Meriden Water Department provides water for use in the Home's kitchen and infirmary. The City of Meriden does not consider this service connection as an interconnection. However, DOHS defines an interconnection as any physical hydraulic connection between two or more pubic water systems. Since the DOHS defines both Meriden Water Department and Bradley Home as public water systems, then the connection which exists between these public water systems is properly considered an interconnection.

E. PROPOSED INTERCONNECTIONS

Several of the utilities in the South Central Area have identified plans to develop future interconnections in order to supplement their available supplies (Table 5-6). Information regarding the proposed interconnections was obtained from the Individual Water Supply Plans. Detailed information regarding some of these interconnections was generally not available since many of the planned interconnections were not to be implemented for many years.

TABLE 5-6
PROPOSED INTERCONNECTIONS IN THE SOUTH CENTRAL AREA[1]

Utilities		
From	To	Comments
Cromwell	Middletown	[redacted] existing to the evaluating the operation of the Berlin-Cromwell interconnection, prior to making a decision.
Middletown	Berlin	A feasibility study is underway.
Middletown	Portland	Crossing of Connecticut River is required.
Metropolitan District Commission	Portland	Proposed interconnection would require extending along the Glastonbury Turnpike.
	Cromwell	Emergency connection possible, pumping would most likely be required because of MDC's lower hydraulic gradient at Rocky Hill.
Connecticut Wate Company - Chester System	[redacted]	

[1] The proposed interconnections were identified via Individual Water Supply Plans as planned system improvements.

TABLE 5-6 (Cont)
PROPOSED INTERCONNECTIONS IN THE SOUTH CENTRAL AREA[1]

Utilities		
From	To	Comments
-	Southington	The Bristol, Meriden, Plainville and New Britain Water Department and South Central Connecticut Regional Water Authority have finished water mains passing through or near a Southington Water Department main. It is recommended in the Southington Water Supply Plan that these utilities interconnect with other systems where feasible. This would allow them to assist each other in a water shortage emergency.
SCCRWA	Wallingford	[redacted]

Source of Information: Individual Water Supply Plans

[1] The proposed interconnections were identified via Individual Water Supply Plans as planned system improvements.

For example, information regarding the physical constraints, or financial and legal considerations involved in developing new interconnections was not discussed in the individual plans. Similarly, the specific locations of the interconnection and the expected volume of water to be exchanged have not been determined in many cases.

F. PURCHASED WATER AGREEMENTS

In accordance with state guidelines for the preparation of individual water supply plans, utilities are to provide copies of written purchase agreements between interconnecting systems in their plans. A summary of the agreements that were submitted is provided below:

[redacted]

emergency, Berlin has agreed to supply Cromwell with water at the same price, subject to minimum pressure within the Berlin distribution system.

[redacted]

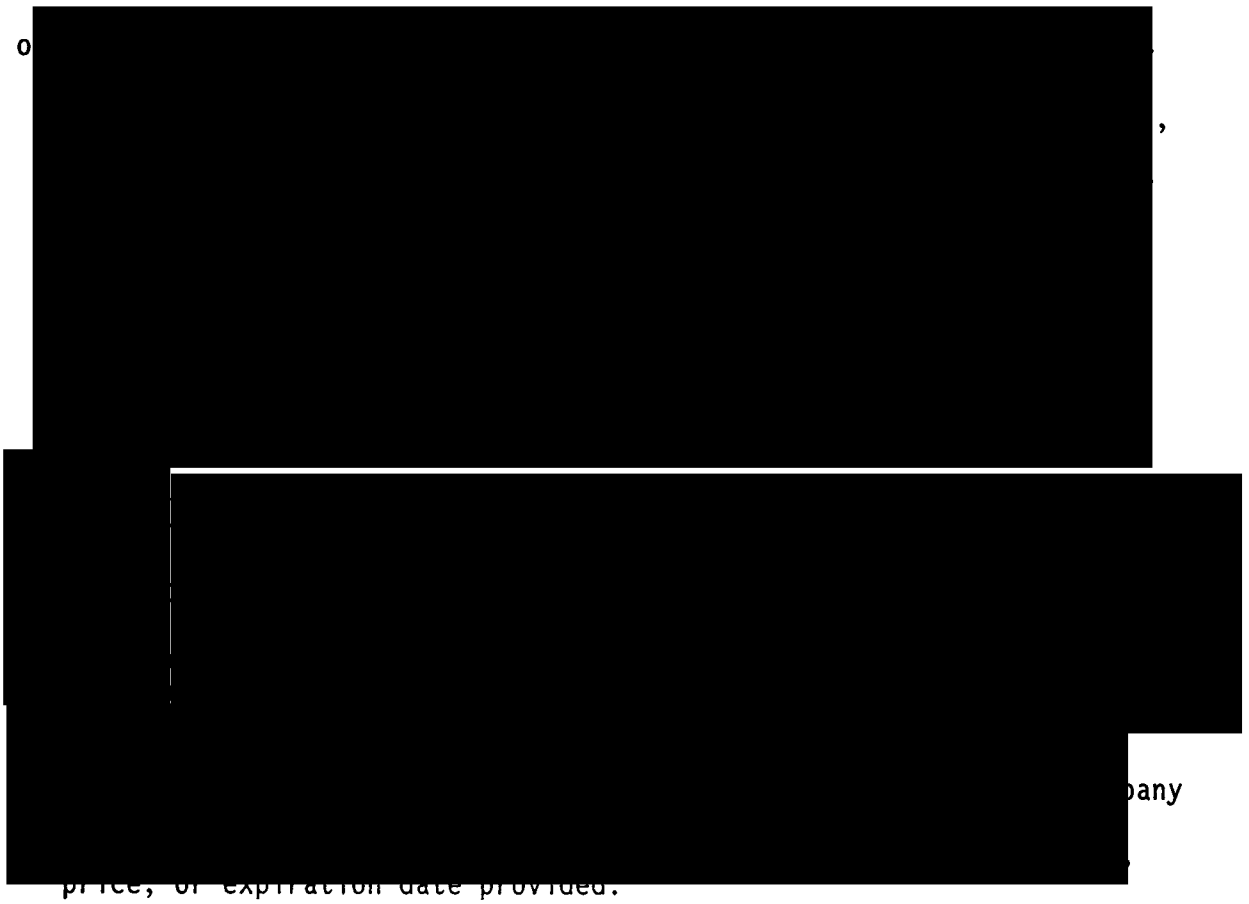
2001. There are optional 10-year renewal periods if both parties agree.

- [redacted]

agreement expires December 31, 2015 and may be renewed at the option

[redacted]

for two additional periods of 10 years each after the expiration date.



G. POTENTIAL FOR FUTURE INTERCONNECTIONS

The South Central Water Supply Management Area has 64 individual public water systems. Forty-nine of these systems serve less than 1,000 people, and 12 systems serve 1,000 people or more. Of the remaining three, the Southington Water Department has a service area in the WUCC which serves only serving only 200 people in Cheshire; the MDC has 20 users in Cromwell; and the Waterbury Water Department owns a surface water supply and surrounding watershed area in Prospect. The total population of the area was approximately 780,440 in 1987, and an estimated 627,120 people, or 80 percent of the total were serviced by public water supplies. Of those served by public water supplies, approximately 6,976 people were served by small utilities.

1. Potential Interconnections Within South Central Area

There are four active interconnections in the South Central Area that supply water for continuous consumption. These interconnections play a significant role in supplying water to the Bridgeport Hydraulic Company customers in Seymour, and Ansonia Derby Water Company customers

in Ansonia, Derby, and Seymour. The development of additional interconnections in the South Central Area could significantly aid in meeting water demands and providing emergency backup supply.

Most of the large systems in this area have identified the need to develop additional sources of supply to meet future demand. Many of the small systems in the area, which are currently dependent on single sources of supply, are vulnerable to future source contamination, have experienced or are experiencing water quality problems, do not have emergency backup power, and/or do not have adequate fire-flow capacity. The use of interconnections, where feasible, could alleviate some of these utilities' water supply needs.

The feasibility of developing new interconnections is dependent upon the topography, distance, and hydraulic differential between existing systems, and the compatibility and availability of supplies. For the larger systems, which have declared large areas as their exclusive service areas, the feasibility of developing new interconnections to existing small systems within their service area increases as their systems are expanded to meet the needs of new or potential customers. Such expansions of the larger systems distribution networks should encourage the use of interconnections for emergency use.

Systems that are located within approximately one-half mile of each other are possible candidates for future interconnection. Existing systems that are located within close proximity of each other are summarized in Tables 5-7 and 5-8. Table 5-7 summarizes the characteristics of the small utilities in the WUCC that are located within one-half mile of each other (those serving less than 1,000 people). Table 5-8 summarizes the characteristics of the large utilities in the WUCC that are located within one-half mile of each other (those serving 1,000 people or more). The Alternative Water Supply Section incorporates this criteria to utilities outside the WUCC.

TABLE 5-7
SUMMARY OF POTENTIAL INTERCONNECTION FACTORS
SYSTEMS SERVING LESS THAN 1,000 PEOPLE

Name of Utility	Town Where Located	Available Supply (gpd)	Utility(s) Within 1/2-Mile Radius
Crestview Condo. Association	Cheshire		SCCRWA[1]
Aaron Manor Conv. Home	Chester		CWC[2] - Guilford Division
Beechwood Mobile Home Park	Killingworth		CWC - Guilford Division
Bernice's Court	Guilford		CWC - Naugatuck Division
Bradley Home	Meriden		Meriden Water Department
Cedar Grove Mobile Home Park	Clinton		CWC - Guilford Division
Evergreen Trailer Park	Clinton		CWC - Guilford Division
Grove School	Madison		CWC - Guilford Division
Gendrons Valley Mobile Home Park	Naugatuck		CWC - Naugatuck Division
Heritage Cove Condos	Essex		CWC - Guilford Division
Highland Heights Water Co.	Prospect		CWC - Naugatuck Division
Henry's Trailer Park	Wallingford		Wallingford Water Division
Krayeske Water Supply	Guilford		CWC - Guilford Division
Leetes Island	Guilford		CWC - Guilford Division
Idleview Mobile Home Park	Naugatuck		CWC - Naugatuck Division
Lorraine Terrace	Middletown		Middletown Water Department
Meadowbrook Rest Home	Essex		CWC - Guilford Division
Mt. St. John School	Deep River		CWC - Guilford Division
Nod Hill Apartments	Clinton		CWC - Guilford Division
Ridgewood Hill Condos	Deep River		CWC - Guilford Division
Walden III Condos	Guilford		CWC - Guilford Division
West lake Lodge	Guilford		CWC - Guilford Division
	TOTAL	934,900	

1 South Central Connecticut Regional Water Authority
2 Connecticut Water Company

TABLE 5-8
SUMMARY OF POTENTIAL INTERCONNECTION
FACTORS - SYSTEMS SERVING MORE THAN 1,000 PEOPLE

Name of Utility	Town	1987 Available Supply (mgd)	1987 Ave. Daily Demand (mgd)	2030 Available Supply (mgd)	2030 Ave. Daily Demand (mgd)	Other Utility(s) Located Within 1/2-Mile Radius
Ansonia Derby Water Co.	Ansonia Derby Seymour		4.1 (system total)	6.45	4.1	BHC-Seymour SCCRWA-Orange BHC-Seymour BHC-Main System
Bridgeport Hydraulic Company-Valley Division	Beacon Falls Seymour		1.65 (system total)	4.9	2.86	CWC-Naugatuck Division ADWCo - Ansonia
Connecticut Water Co. Naugatuck Division	Beacon Falls Naugatuck		3.19 (system total)	12.8	6.0	Waterbury BHC-Seymour BHC-Seymour
Cromwell Fire District	Cromwell		1.3	10.66	4.2	Middletown Water Dept. MDC
Meriden Water Department	Meriden		6.8	12	10	SCCRWA-Cheshire Wallingford Water Division

TABLE 5-8 (Cont)
SUMMARY OF POTENTIAL INTERCONNECTIONS
FACTORS - SYSTEMS SERVING MORE THAN 1,000 PEOPLE

Name of Utility	Town	1987 Available Supply (mgd)	1987 Ave. Daily Demand (mgd)	2030 Available Supply (mgd)	2030 Ave. Daily Demand (mgd)	Other Utility(s) Located Within 1/2-Mile Radius
Middletown Water Department	Middletown	[redacted]	4.5	21.2	13.2	Cromwell Fire District Portland Water Dept.[1]
Portland Water Department	Portland		.71	3.5	1.05	Cromwell Fire District[1] Portland Water Dept.[1]
South Central Connecticut Regional Water Authority	Cheshire North Haven Orange		56.77 (system total)	90.0	73.7	Meriden Water Dept. Wallingford Water Div. ADWCo-Derby
Wallingford Water Division	Walling-ford		6.02	12.2	11.0	SCCRWA-North Haven Meriden Water Dept.

[1] Would require Connecticut River crossing.

2. Potential Interconnections With Systems Outside of the South Central Area

Five public water supply systems are located on the outskirts of the South Central Management Area: the Bridgeport Hydraulic Company Main System, the Waterbury Water Bureau, the Berlin Water Control Commission, the Southington Water Department, and the Metropolitan District Commission (MDC). Additional interconnections between the South Central utilities and these five systems could be developed to provide water for emergency backup or continuous use.

Bridgeport Hydraulic Company - Main System

The BHC Main System is not currently connected to any of the public water supply systems in the South Central Area. Potential interconnection opportunities exist between BHC-Main and SCCRWA in Milford and Orange, and the Ansonia Derby Water Company (ADWCo) in Derby or Seymour. A previous interconnection between BHC-Main and ADWCo in Derby is inoperable due to past storm damage. There are no plans to reconstruct this abandoned connection.

Potential interconnection between the BHC-Main System and the adjacent South Central systems is not likely in the immediate future due to the costs involved and the existing adequate sources of supply currently available to meet SCCRWA's and ADWCo's needs.

Waterbury Water Bureau

The Waterbury Water Bureau system is located immediately outside of the WUCC boundary in Naugatuck. Potential interconnection between the Naugatuck Division of the Connecticut Water Company and the Waterbury Water Bureau could provide emergency backup supply for both systems, or be a supplemental supply source for Naugatuck during peak demand periods. The Waterbury Water Bureau indicates that available supplies are more than adequate to meet existing and future demand, while the CWC-Naugatuck Division is facing future supply shortages.

Southington Water Department

The Southington Water Department system extends slightly beyond the WUCC boundary in Cheshire, and serves approximately 200 people within the WUCC area. Future interconnection with the SCCRWA system in Cheshire could provide emergency backup supply for both systems, and/or provide a source of continuous supply for Southington. Continuous sale of water from SCCRWA to Southington is, however, contingent upon the

SCCRWA's supply availability and an extension of its legislatively established boundary. A legislative boundary revision would not be needed if water were sold on a wholesale basis. Southington is facing pending supply shortages, and must develop additional sources to meet projected demand.

Berlin Water Control Commission

[redacted]

Metropolitan District Commission

The MDC system extends slightly beyond the WUCC boundary in Cromwell, providing service to approximately 20 people. The potential for future interconnection between the Cromwell Fire District and MDC exists, especially for the purposes of emergency backup supply for both systems. Long-term interconnections for continuous supply are not proposed because the supply available to both utilities is apparently adequate. The benefits of a future long-term supply agreement for either system would be, however, contingent upon long-term supply availability and demand levels of both utilities.

VI. JOINT-USE MANAGEMENT AND OWNERSHIP

A. INTRODUCTION

The South Central Connecticut Water Supply Management Area is composed of 36 towns which are served by 64 public utilities or public water systems. These supply agencies range in size from serving more 380,000 people to serving only 25 people. Of these 64 utilities:

- Fifteen serve 1,000 people or more
- Forty-nine serve less than 1,000 people
- Of these, 31 serve less than 100 people

The number of small to very small utilities within this South Central Connecticut Area certainly appears to strengthen the concept that joint-use management, or ownership arrangements may benefit overall public supply and service. Section IV of this report identifies and discusses interconnections. This section will identify the benefits of joint-use management and areas where small utilities' supply and service could be enhanced by working with the larger organizations. Expanded utilization of equipment and staff, and access to additional facilities and water sources may benefit the larger utilities as well.

B. CONCEPTS

Public Act 85-535, requires "A plan for joint-use management or ownership of services, equipment, or facilities, including:

(bb) A list of existing and planned shared or joint-use facilities, together with documentation from the utilities involved outlining limitations on and arrangements and schedules for development, use, operation, and maintenance of such facilities.

(bb) Identification of services and equipment which could be made available to other utilities such as, but not limited to, leak detection and repair, and emergency equipment."

Therefore, the task is to review the concept that utilities can increase their operational efficiency while reducing their operating costs through sharing facilities and services.

Generally speaking, joint-use management may be subdivided into three major categories. The first, infrastructure, would encompass the physical aspects of the system which deal with water supply, treatment, storage, and distribution. Infrastructure would include elements such as:

- Water source
- Pumping facilities
- Water treatment facilities
- Transmission mains system
- Distribution mains system
- Water storage facilities

The second category would be equipment and supply inventories. These items would be those not only used to respond to emergency situations, but also used for normal system maintenance, system expansion, and installations not subcontracted out to a third-party contractor. Equipment in this category would include:

- Excavation equipment
- Pipe stores
- Fittings
- Pipe-cutting equipment
- Portable pumps
- Backup generators
- Compressors
- Water tanks
- Leak-detection equipment
- Meter-testing equipment

Many of these items are commonly maintained by larger utilities but are not affordable to a small water supply operation inventory. Therefore, some maintenance and testing may not be carried out in as timely a fashion by the small supplier as would be desirable.

The third category relating to joint-use management concerns manpower, business functions, and facilities. There is a wide spectrum of manpower skills involved in water supply operations. These range from engineering/consulting skills, to business functions and management, to field skills such as meter reading, system maintenance, testing, and repair. This category would include such functions as:

- Engineering and design
- Recordkeeping
- Accounting
- Billing

- Computer services
- Laboratory facilities and testing
- Maintenance and repair
- Meter reading

These are various types of skilled staff that small utilities may not be able to afford to have while larger utilities are more likely to maintain.

C. ADVANTAGES AND DISADVANTAGES

Large utilities already have informal sharing agreements to help one another in times of emergency. Although, currently there is no formal information exchange concerning what goods and services each utility has available, companies are aware of what other utilities have through industry association and day-to-day dealings, and know where to turn for help in the event of an emergency. What must be further considered, therefore, are advantages and disadvantages presented by joint-use management, or ownership on continuous day-to-day operations, maintenance, and expansions. It would be expected that the greatest advantage of joint-use arrangements would be for the small suppliers. Such advantages would include:

- Access to major supply sources which small suppliers would be financially unable to develop themselves
- Access to facilities and equipment that would be cost-prohibitive to provide for themselves
- Access to reliable sources of skilled manpower at rates that may be less than through third-party contractors or consultants
- Ability to benefit from a large utilities' volume purchase agreements to acquire pipe, fittings, meters, etc., at a lower cost
- Ability to establish a relationship and deal with one organization to fulfill their needs rather than with a variety of subcontractors
- Access to the management and financial expertise of a larger utility

Advantages to the larger utilities may not be so readily apparent. These organizations already maintain sufficient larger inventories of supplies and equipment, and support larger manpower pools. However, advantages may include:

- Better utilization of their equipment and staffs
- Access to additional facilities and sources of supply which may ease their response to future demand increases

The public, served by the small suppliers, should benefit from a higher level of more consistent service. The public, served by both the large and small suppliers, could benefit from rate reductions resulting from the:

- Elimination of redundancies and inefficiencies of more organizations providing similar functions
- More efficient use of already identified and developed water supply services

Disadvantages to joint-use arrangements are somewhat harder to identify, because most of them will be the result of factors not identified where the arrangements were negotiated. Possible disadvantages are:

- Failure of a facility critical to more than one system (e.g., pumping stations or treatment facilities) would affect a larger service area
- Excessive or competing demands for water sources during periods of extreme stress
- Excessive or competing demands for equipment and/or manpower
- Abuse of jointly-used facilities and/or equipment
- Differences in management style between the water utilities

However, careful structuring of joint-use management agreements should anticipate many such problems and have provisions to accommodate them if they should occur.

Both municipal and private investor-owned utilities are represented within the South Central Connecticut Water Supply Management Area. The individual municipal charters which govern the municipal utilities may restrict what these organizations can do outside of their respective service areas. Beyond charter constraints, there is no distinction between the types of joint-use arrangements that can be entered into by either municipal or investor-owned utilities.

D. CURRENT JOINT-USE MANAGEMENT IN THE SOUTH CENTRAL CONNECTICUT AREA

Currently, there are a number of interconnections within the South Central Area and these have been summarized in Tables 5-1 through 5-3 (in the previous section). Table 5-6 summarizes the proposed interconnections within the area. Other than these, there are not many other examples of consistent joint use. As mentioned earlier, informal agreements exist among facilities to provide equipment and support to aid one another in emergencies. Additional examples of joint-use management or services that have been, or are provided by utilities are below.

Bridgeport Hydraulic

- Provides management consulting services to Plainville Water Company on function's including:

  Engineering
  Management of day-to-day operations and business functions
  Financial and fund-raising consulting
  Agency correspondence and coordination
  Requisition assistance for wholesale water agreement

  The contractor of these management consulting services is currently awaiting DPUC approval.

- Provides fee laboratory analytical services.

Meriden Water Bureau

- Has a contract to provide water to a portion of Wallingford's exclusive service area, principally along South Broad Street.

- Has an agreement with Southington to supply water to the Johnson Hill area contiguous to Meriden until Southington extends their distribution system to that area.

- Provides water to the Bradley Home's area in the center of Meriden although Bradley Home is a separate exclusive service area unto itself.

Portland Water Works

- Has been contacted by Rivercrest Water Company for preliminary conversations regarding how Portland Water could provide assistance, if necessary.

SCCRWA

- Provides recordkeeping and billing functions for the New Haven Water Pollution Control Authority.
- Provides contract meter testing services for Ansonia Derby Water Company and Bridgeport Hydraulic Water Company.
- Provides, or has recently provided, fee laboratory analytical services on an as needed basis for:

Ansonia Derby
Berlin Water Control Commission
Bridgeport Hydraulic
City of Danbury
City of Groton
New Canan Water Company
Norfolk District No. 2
City of Norwich Public Utilities
Plainville Water Company
Southington Water Department
Stamford Water Company
Wallingford Water Department

E. FUTURE JOINT-USE MANAGEMENT IN THE SOUTH CENTRAL CONNECTICUT AREA

Whitman & Howard, Inc. conducted telephone interviews with larger water suppliers to gather specific examples and to identify which elements of infrastructure, equipment and supply, and manpower and business functions, were currently available to be shared. Naturally, much of the information received was "informed opinion" because no specific joint ventures were identified. Therefore, magnitude of demand or commitment could not be assessed. Tables 6-1 through 6-3 summarize the results of these conversations and the types of goods and services that the large utilities can provide to others. The tables also indicate which goods and services can be supplied on a long-term, or only on an emergency basis. Depending on the request for joint use, there may be geographic, contractual, seasonal, or other constraints on the larger utilities' ability to respond. These are considerations which will have to be resolved as formal agreements and entered into in the future.

This survey does demonstrate, however, that there are suppliers who can provide smaller utilities with most all of the previously identified aspects of infrastructure, equipment and supply, and manpower and business functions. Some organizations can provide a good deal of support while others can only provide only limited or emergency support.

TABLE 6-1
ELEMENTS OF INFRASTRUCTURE AVAILABLE FOR JOINT USE

Utility	Source and Supply	Storage	Mains		Treatment
			Transmission	Distribution	
Ansonia/Derby Water Company	*	o	*	*	*
Bridgeport Hydraulic	*	*	*	*	*
Connecticut Water Company	*	*	*	*	*
Cromwell Fire District	*	o	*	NA	o
Heritage Village Water Company	*	*	o	o	NA
Meriden Water Bureau	NA	o	NA	NA	NA
Metropolitan District Commission	o	o	*	*	o
Middletown Water Department	NA	NA	NA	NA	NA
Portland Water Works	o	NA	NA	NA	o
SCCRWA	*	*	*	*	*
Wallingford Water Division	NA	o	o	o	NA
Waterbury Water Department	NA	NA	NA	NA	*

* Elements which can be provided.
o Elements which can be provided only on a short-term or emergency basis.
NA - Not Available to be provided.

TABLE 6-2
ELEMENTS OF EQUIPMENT AND SUPPLY AVAILABLE FOR JOINT USE

Utility	Excavation Equipment	Pipe Stores	Fittings	Jointing/ Cutting Equipment	Meters and Testing	Compressors/ Generators	Leak Detection	Water Tanks	Pumping Equipment
Ansonia/Derby Water Company	*	*	*	*	*	*	*	*	*
Bridgeport Hydraulic	*	*	*	*	*	*	*	*	*
Connecticut Water Company	*	*	*	*	*	*	*	*	*
Cromwell Fire District	*	o	o	*	*	*	o	NA	*
Heritage Village Water Company	NA	o	o	*	*	*	o	NA	NA
Meriden Water Bureau	*	o	o	*	o	*	NA	*	*
Metropolitan District Commission	*	o	o	*	*	*	NA	*	*
Middletown Water Department	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portland Water Works	*	*	*	*	*	*	*	*	*
SCCRWA	*	*	*	*	*	*	*	*	*
Wallingford Water Division	o	o	o	o	*	o	o	NA	NA
Waterbury Water Department	*	*	*	*	o	*	NA	NA	o

* Elements which can be provided.
o Elements which can be provided only on a short-term or emergency basis.
NA - Not Available to be provided.

TABLE 6-3
ELEMENTS OF MANPOWER AND BUSINESS FUNCTIONS AVAILABLE FOR JOINT USE

Utility	Meter Reading	Recordkeeping	Billing	Computer Services	Engineering/ Design	Skilled Manpower	Laboratory Testing
Ansonia/Derby Water Company	*	*	*	*	o	o	NA
Bridgeport Hydraulic	*	*	*	*	*	*	*
Connecticut Water Company	*	*	*	*	*	*	NA
Cromwell Fire District	NA	NA	NA	NA	NA	NA	NA
Heritage Village Water Company	o	*	*	*	NA	o	*
Meriden Water Bureau	NA	NA	NA	NA	o	o	NA
Metropolitan District Commission	*	*	*	*	o	*	NA
Middletown Water Department	NA	NA	NA	NA	NA	NA	NA
Portland Water Works	NA	NA	NA	NA	NA	NA	NA
SCCRWA	*	*	*	*	*	*	*
Wallingford Water Division	o	NA	NA	NA	NA	o	NA
Waterbury Water Department	NA	NA	NA	NA	NA	*	o

* Elements which can be provided.
o Elements which can be provided only on a short-term or emergency basis.
NA - Not Available to be provided.

Survey questionnaires were reviewed to identify possible needs for joint-use elements of water suppliers. Table 6-4 defines the problems or needs and Table 6-5 identifies each of the small suppliers' needs. It should be pointed out that this table depicts an extremely conservative estimate and that several organizations chose not to respond to the survey. Nothing was added to the table unless it was specifically identified in the questionnaire response. It is not difficult to imagine that there are significant unstated needs. For example, although no companies listed the need for management or financial expertise, the WUUC believes that there are small utilities that could benefit from the managerial and financial expertise provided by the larger utilities.

A comparison of all tables indicates that there are current needs for joint utilization of facilities, equipment, etc., as well as organizations which can fulfill those needs. The following companies, for example, are expanding their operations and have stated that their ability to support smaller utilities will increase in the future.

- Ansonia Derby Water Company
- Connecticut Water Company
- Portland Water Works
- SCCRWA

Considering supply and treatment needs of many small utilities, and the proposed interconnections discussed in this report, future joint use will likely be dominated by the sharing of elements of infrastructure. Naturally, the extent that this occurs will depend on the amount of geographic separation between the utility receiving help and the utility giving it. The cost, complexity, and need for developing new sources of supply are additional factors which will govern the extent of future joint-use arrangements. Future interconnections may also provide opportunities to build jointly-used storage, pumping, and treatment facilities.

Although joint use of infrastructure may dominate future arrangements, sharing of equipment and manpower skills should help utilities conduct their business in a more cost-effective fashion. As alluded to earlier, many of the small water suppliers providing service to a limited number of customers may not have the management and/or financial expertise to provide

TABLE 6-4
DEFINITIONS FOR PROBLEMS OR NEEDS

Supply Shortfalls	The utility has experienced periodic supply disruptions due to inadequate source of supply.
Treatment	The utility has listed a water quality problem that required treatment.
Leak Testing	The utility does not engage in leak detection surveys.
New Equipment	New equipment needed to continue existing level of service.
Maintenance	Equipment and labor needed for routine maintenance of system.
Expansion	Utility indicated plans for expanding service in the future.
Storage	Additional treatment water storage capacity indicated.
Emergency Power	Utility currently does not have emergency power backup systems.
Water Testing	Utility can utilize assistance for laboratory analysis for water quality.

TABLE 6-5
IDENTIFIED PROBLEMS OR NEEDS

Utility	Supply Shortfalls	Treatment	Leak Testing	New Equipment	Maintenance Equipment	Maintenance Labor	Expansion	Storage	Emergency Power	Water Testing
Aaron Manor		X	X							
Amston & Beseck Water Company				X	X	X			X	
Beechwood Mobile Home Park		X		X				X	X	
Bittersweet Ridge Water Company		X		X						
Blue Trails Acres Association				X					X	
Bradley Home									?	X
Cedar Grove Mobile Home Park	X	X		X	X	X		X	?	
Connecticut Valley Hospital			X							
Crestview Condominium Association	X	X		X						
Dogwood Acres								X		
Durham Center Water Company	X	X		X	X	X				X

TABLE 6-5 (Cont)
IDENTIFIED PROBLEMS OR NEEDS

Utility	Supply Shortfalls	Treatment	Leak Testing	New Equipment	Maintenance Equipment	Maintenance Labor	Expansion	Storage	Emergency Power	Water Testing
Evergreen Trailer Park		X								
Gedron's Valley Mobile Home Park		X							X	
Green Springs Water Company	X		X						X	
Hemlock Park Apartments			X							
Heritage Cove Condominium									X	X
Harmony Acres			X							
Highland Heights Water Company		X	X						X	
Hillview Water Association	X	X							X	
Idleview Mobile Home Park		X	X				X		X	

TABLE 6-5 (Cont)
IDENTIFIED PROBLEMS OR NEEDS

Utility	Supply Shortfalls	Treatment	Leak Testing	New Equipment	Maintenance Equipment	Maintenance Labor	Expansion	Storage	Emergency Power	Water Testing
Krayeske Water Supply	X	X							X	X
Lake Grove at Durham		X	X							
Lorraine Terrace			X							
New Lakeview Convalescent	X	X						X	X	
Nod Hill Apartments		X								
Northforo Glen Condominium		X								
Rivercrest Water Association	X	X	X	X					X	
Westlake Lodge				X				X		

water as efficiently and cost-effectively as possible. These are functions which larger utilities are qualified to provide and which the smaller utilities should continuously consider as available options to them.

Once a utility identifies a problem and finds another utility which can aid in solving it, several cooperative arrangements can be made. Equipment and hardware may be bought, rented, or borrowed. Contractual-based services can be addressed and agreed upon by the individual companies involved in considering them.

The 1986 Amendments to the Safe Drinking Water Act (SDWA) are increasing the monitoring requirements for water quality. It is likely that some form of shared facilities or joint-use management may be necessary for some of the smaller operators to cost effectively meet these requirements. Therefore, access to laboratory facilities and functions may also provide an attractive opportunity.

VII. SATELLITE MANAGEMENT

A. INTRODUCTION

The owners and operators of small water systems (systems serving less than 1,000 people) are often faced with situations that adversely affect their ability to provide adequate service to their customers. Problems, such as insufficient capital to meet operation and maintenance costs, cannot be resolved in a way that will keep individual customers rates at a reasonable level. The limited revenues and assets are the fundamental problem, whether it is evident in the system's inability to raise sufficient capital for expansions or repairs, or in staff salaries high enough to attract skilled management. In addition, many small water systems are located in rural or other low density areas with low population growth rates; these systems have no predictable future potential to gain a larger customer tax base to finance capital improvements.

Sharing the financial burden with one or more other utilities is often an advantage for satellite management recipient utilities. Regionalization or satellite management can also benefit the firm providing the management assistance; however, there must be an element of profitability for that firm. The commonality of satellite managed utilities is that they are physically removed or presently noninterconnected with the managing entity.

B. CONCEPT OF SATELLITE MANAGEMENT

Satellite management is defined in the Regulations Concerning Coordinated Water System Plans pursuant to Section 25-33h of the Regulations of Connecticut State Agencies as: "management of a public water supply system by another public water system." P.A. 85-259, "An Act Concerning Satellite Management of Water Companies and Expedited Rate Proceedings on a Limited Basis", governs satellite management services in Connecticut. Satellite management can take many different forms, ranging from the simple provision of technical, managerial, and operational assistance based on oral agreement, to outright purchase and operational responsibility of an individual utility. The varying degrees of satellite management are reviewed in this section, with the objective of creating an areawide philosophy for satellite management and its potential future use.

Satellite management is one alternative available to small utilities faced by management, fiscal or technical problems, or treatment requirements. Other alternatives, such as merging adjacent small water utilities, or forming regional water utilities and water districts, are not reviewed in this section.

The Safe Drinking Water Act Amendments of June 1986 have also created incentives for small water utilities to explore assistance options such as satellite management. Requirements such as frequently monitoring, analyzing, and reporting water quality data can exceed the capabilities of the typical small water utility. As the regulations for the 1986 Amendments are generated, many small utilities will have to devise strategies for satisfying the new requirements.

C. TYPES OF MANAGEMENT

There are several types of management options available to small water utilities; nonstructural, structural, and joint-use agreements. In some cases, utility owners may request a transfer of ownership to a qualified agency. In other cases, utilities may only require support services from qualified professionals on a contract or fee basis.

1. NONSTRUCTURAL MANAGEMENT

Nonstructural management types are limited to those which allow the managed utility to retain its complete identity, service area, management, and in the case of a municipal utility, its "home rule." Nonstructural options emphasize a change in business practice or in technical assistance, but the important factor is that the original water system organizational structure is maintained.

Water systems can agree to share such items as laboratory facilities, storage facilities, and billing equipment. Generic examples of additional opportunities that nonstructural agreements can include are:

- Joint purchasing agreements for chemicals
- Joint hiring of personnel
- Provision of water for emergency use
- Shared use of operations and maintenance personnel
- Shared joint technical equipment
- Exchange of supplies for emergency use

An informal agreement is the most flexible kind for utilities, and is advantageous because user approval is not required. Traditionally, one of the most common nonstructural occurrences amongst water utilities is their willingness to provide assistance to one another in an emergency. Sharing of one utility's inventory, specialized equipment, or technical resources with another utility which is experiencing an immediate system failure is often initiated with a telephone call and continues throughout the duration of the problem. This cooperation between utilities is unquestionable because they universally recognize the importance of the integral relationship between water supply and public health. Informal agreements have the following advantages and disadvantages:

Advantages

- Easy to create, implement, or change
- Easy to adjust for the duration of need
- Easy to terminate
- Predecessed future formal agreements

Disadvantages

- Legally unenforceable
- No formal continuity
- Easy to terminate
- Possible to misunderstand or misinterpret terms of agreement

2. Structural Management

Structural options involve creating a new management structure to operate the existing system. As a result, a permanent change occurs in the status and policies of the managed utility. Structural options can include creating a new water supply association, corporation, or special water supply district, or revising an existing utility's policies.

A new water supply entity can be an investor-owned utility. The title of the entity depends upon the appropriate legislation. Associations or nonprofit water supply corporations are one alternative, while local, special purpose districts are another. The largest of these district's is the areawide district or authority, such as a regional water authority, which may encompass several municipalities either by voluntary action or takeover. These organizations are autonomous and dependent on the revenue bond market for funding.

The following specific advantages and the disadvantage of structural management agreements are dependent upon the type of agreement and the utilities concerned:

Advantages

- Agreements can be relatively easy to create
- Acquisition of water sources is feasible by new entities
- Power of eminent domain can be established
- New entity can instruct and operate water distribution systems
- New entity can issue bonds for funding purposes
- Agreements can establish nonprofit, public entities
- Agreements can establish water supply entities that may be able to operate more efficiently than individual municipal-type systems
- New entities may provide greater financial flexibility
- Agreements can provide more centralized water resource planning and coordination

Disadvantage

- New entities can have limited power in relation to other governmental units

3. Joint-Service Contracts

Joint-service contracts are formal agreements through which parties share or exchange services. Joint-service contracts will be used most frequently in planning, contracting, constructing, and possibly operating joint facilities. For instance, joint-service contracts may be used for the development of new sources of supply, the ownership of storage and laboratory space and maintenance equipment, and the bulk purchase of chemicals or other materials. One way in which joint services are facilitated is through areawide minimum design standards which make replacement and operation procedures more consistent among utilities.

Joint-service contracts involve advantages and disadvantages for the users:

Advantages

- Contracts are easily created
- Existing system operation may not require disruption
- Contracts are more permanent than basic service contracts
- Contracts can provide more efficient use of new personnel and equipment
- No user approvals are required

Disadvantages

- Contracts may have an impact on local autonomy and policy control
- Equitably distributing costs can be difficult
- Computing overhead costs can be difficult
- Terminating the contract can be difficult
- Problems can occur in the event that one of the shared facilities fails

D. SATELLITE MANAGEMENT CRITERIA

The success of any satellite operation depends upon the resources of the managing firm. The managing utility can ensure that it has adequate resources to meet both the current and future needs of the receiving utility by meeting the following criteria prior to settling a management agreement:

- Sufficient, qualified, operators available to ensure adequate service to customers of all managed systems
- Experience in daily water system operation
- Appropriate trade or professional licenses if services require them, such as certification as distribution or treatment operators
- Twenty-four hour emergency response service available to all customers
- Written financial plan for operations and maintenance services

The receiving utility must decide what improvements are needed to their operation and whether or not satellite management is the best alternative to attain those improvements. Factors such as cost, distance between systems, condition of the satellite system, and the type of ownership should be weighed prior to finalizing an agreement.

E. ADVANTAGES AND DISADVANTAGES OF SATELLITE MANAGEMENT

Satellite management can improve the financial, technical, and managerial status of the receiving utility. Specific functions which may be contracted between one or more utilities and thus, improve effectiveness and efficiency in their operations include:

- Water purchase contracts - wholesale and retail
- Raw water supply/fire protection service
- Operations and maintenance work for emergency situations
- Water plant operation and maintenance
- Distribution system maintenance
- Meter reading, billing, and collection
- Lab analysis
- Cross-connection surveys
- Leak detection

As an example, contracted laboratory services are becoming more available as drinking water utilities strive to comply with increasingly stringent new regulations, such as the 1986 Amendments to the Safe Drinking Water Act (SDWA). In response to this trend, larger water utilities are beginning to expand their laboratory capabilities and services. Utilities requiring these services should take advantage of the laboratory services of the larger utilities through service contracts.

Drinking water laws, such as the SDWA, require that utilities use increasingly sophisticated management and technology. The utility is responsible to conform to these laws (SDWA). Compliance may be difficult for water systems owned by an individual or small housing association. It is unlikely that any public funding assistance will be given to these types of ownership structures; conformance could prove to be an overwhelming financial burden for these water systems. All utilities should review their current and future management and ownership status, and determine their ability to conform and maintain the financial burden. In recognition of increased statutory requirements, it is important that the utilities realize that this time is an opportunity to review the advantages and

disadvantages of ownership, and see the potential for widening the management or operation of their system. Table 7-1 summarizes some of the advantages and disadvantages of satellite management.

F. CURRENT USE OF SATELLITE MANAGEMENT IN SOUTH CENTRAL AREA

Public Act 85-535 requires each water supply management area to prepare a plan for satellite management. The plan should identify utilities that are currently operating under satellite management type agreements and also utilities that might be willing to accept or offer satellite management services.

This section summarizes the utilities currently involved in satellite management. The majority of these are real estate firms whose managers administer or represent the entire facility of which water supply management is an adjunct obligation. R.J. Black & Son and Pump Services, Inc. provide contract maintenance services to their respective clients. According to Edward Jacobs, owner of The Amston & Beseck Water Company, their only current operations are the satellite operations at Lake Beseck and Lake Amston. The Amston & Beseck Water Company owns the water supply facilities and sells water to these communities.

Table 7-2 and 7-3 identify utilities receiving satellite management and those which have indicated a willingness to offer satellite management services, respectively.

G. POTENTIAL USE OF SATELLITE MANAGEMENT IN SOUTH CENTRAL AREA

In general, satellite management agreements are appropriate for small utilities that may need help in providing adequate service to their customers. As previously noted, satellite management can provide administrative, technical, and/or operational assistance for the receiving utilities. The state's desire to limit the proliferation of new water systems will provide an incentive for increased satellite management.

Satellite management should play a more significant future role in the South Central WUCC area. Although 13 small utilities currently operate under off site management agreements, a number of utilities could benefit from the assistance that satellite management can give them in the future. For example, many small utilities will be facing additional operational burdens associated with the requirements of the 1986 SDWA Amendments, and satellite management agreements could alleviate this burden.

TABLE 7-1
GENERAL ADVANTAGES AND DISADVANTAGES OF SATELLITE MANAGEMENT FOR LARGE AND SMALL UTILITIES

Small Utilities (Satellite)	Large Utility (Manager)
ADVANTAGES:	ADVANTAGES:
- Provides infusion of new capital	- Provides financial fee for management
- Retains control of routine operations	- Provides other services in lieu of fee (e.g. raw water source)
- Requires use of trained personnel	- Expands revenue base
- Establishes possible interconnections	- Provides common design criteria and standardization
- Provides common design criteria and standardization	- Shares capital cost of laboratory
- Establishes wider range of professional assistance	- Increases profit to investor-owned utilities
- Realizes lower laboratory costs	- May open new source of water, being surplus from small utility
- Provides general improvements of resources	- May absorb any small excess of staff time
- Retains local autonomy	- May ease later absorption if contemplated
- Improves water quality	
- Assists in times of emergency	
DISADVANTAGES:	DISADVANTAGES:
- Becomes less independent	- May have problems with several small utilities taxing resources
- Becomes less independent	- May require increasing staff
- Becomes fearful of being absorbed at later date	
- If absorbed, and, depending on past management system maintenance, rates may significantly increase	
- May lose some of its identity	

TABLE 7-2
UTILITIES RECEIVING SATELLITE MANAGEMENT

Name of Satellite Manager	Utility(s) Managed
Rollar Home Inc. 133 W. Main Street Clinton, CT 06413	Cedar Grove Mobile Home Park Evergreen Mobile Home Park
R.J. Black & Son, Inc. 740 Thomaston Road Watertown, CT 06795	Harmony Acres Mobile Home Park Idleview Mobile Home Park New Lakeview Convalescent Home
Don Ianicelli Pump Services Inc. 303 State Street North Haven, CT 06473	Mill Pond Elderly Housing
Amston & Beseck Water Co. 44 Strickland Road Middlefield, CT 06455	Beseck Lake Community Amston Lake Community
Hank Barkon Margolis Realty Co. One Evergreen Ave., Suite 24 Hamden, CT 06518	Crestview Condo. Assoc. Inc.
Douglas Armstrong Coughlin and Coughlin Realty & Insurance 158 Broad Street, Box 327 Middletown, CT 06457	Haddam Elderly Housing
John Ellis Associates 239 Williams Street New London, CT 06320	Hemlock Apartments
R. Lengyel, Exec. Vice President Naugatuck Valley Savings 21 Maple Street Naugatuck, CT 02770	Highland Heights Water Company
Boyer Realty Management Attn: Owen Ahern 120 Washington Street, Suite 27 Middletown, MA 06457	Sylvan Ridge
Rachelle Dube, Property Manager P.O. Box 921 Levy-Leventhal Assoc. Orange, CT 06477	Walden III Condos

Source of Information - Connecticut Department of Health Services, October 1988

TABLE 7-3
UTILITIES INTERESTED IN PROVIDING SATELLITE MANAGEMENT

Utility	Community
South Central Connecticut Regional Water Authority	Other utilities or developers within the SCCRWA's exclusive service area considered on a case-by-case basis
Bridgeport Hydraulic Company	Any utility in study area considered on a case-by-case basis
Connecticut Water Company	Existing or proposed systems within CWC's exclusive service area

In accordance with WUCC policy, it is assumed that any utility claiming an exclusive service area that surrounds other existing utilities would be the appropriate provider of satellite management services. Information regarding systems that are currently interested in receiving satellite management services is unavailable; however, Table 7-4 is a matrix of the potential needs of the individual small utilities. This table was developed from information provided in the Water Supply Assessment. Utilities included in the assessment were selected based on an indication that they had single or inadequate sources of supply, provided no fire protection, and/or experienced water quality problems.

A review of Table 7-4 shows that some small utilities are particularly deficient in available supply. For some of these small utilities, interconnections may be an appropriate alternative to alleviate supply problems. Potential candidates for long-term satellite management based on the criteria described in Table 7-4 included: Bernices Court, Durham Center Water Company, Ed's Trailer Park, Krayeske Water Supply, Leetes Island, and Henry's Trailer Park. These systems have a combination of characteristics, such as single supply sources located near potential sources of contamination, that indicate a need in which long-term satellite management, structural takeover, or possibly interconnections can satisfy in order to provide safe and adequate water service to the existing customers.

H. PHILOSOPHY FOR SATELLITE MANAGEMENT

In order to sustain a successful satellite management program, benefits must be available to all parties involved. The utility potentially receiving satellite management must know what improvements on services it needs, and the managing utility must be aware of the services it can provide. The manager can receive financial rewards from the fees charges for services, along with hidden benefits such as the sharing or joint use of supplies. With the sharing of capital or operations and maintenance costs of both equipment and manpower, the greatest potential gain is to the satellite-managed utility.

TABLE 7-4
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA [1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Aaron Manor Home	Connecticut Water Company (CWC) Guilford-Chester Division	78	[redacted]				
Beechwood Mobile Home Park	CWC-Guilford Chester Division	750					
Bernices Court	CWC-Guilford Chester Division	29					
Bittersweet Ridge	Amston Beseck Water Company	40					
Blue Trails Assoc.	South Central, CT Regional Water Authority (SCCRWA)	216					
Bradley Home	Meriden Water Department	151					

[1,2]See footnotes at end of this table.

TABLE 7-4 (Cont)
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA[1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Country Manor	Not Determined	150	[redacted]				Nearby subsurface disposal system failures.
Descrocher Apts.	Amston Beseck Water Company	25					No problems indicated.
Dogwood Acres	Amston Beseck Water Company	35					No problems indicated.
Durham Center Water Company	Amston Beseck Water Company	154					Historically poor water quality in Durham area - existing surface supply to be abandoned.
Ed's Trailer Park	Undetermined	138					Low pH, numerous nearby septic systems.
Gendron's Valley Mobile Home Park	CWC - Naugatuck Division	195					Elevated sodium and coliform.

[1,2]See footnotes at end of this table.

TABLE 7-4 (Cont)
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA[1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Green Springs Subdivision	CWC - Guilford Chester Division	105	[redacted]				No problems indicated.
Grove School	CWC - Guilford Chester Division	94					Sodium levels elevated.
Happy Acres	Amston Beseck Water Company	130					No problems indicated.
Hawkstone Terrace	Bridgeport Hydraulic Company	56					No problems indicated.
Henry's Trailer Park	Wallingford Water Division	65				[redacted]	
Hillview Water Supply	SCCRWA	36					Coliform count elevated, disinfection provided.
Krayeske Water Supply	CWC - Guilford Chester Division	50 unknown.					Supply determined consumption by DOHS.

[1,2]See footnotes at end of this table.

TABLE 7-4 (Cont)
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA[1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Lake Grove at Durham	Amston Beseck Water Co.	150					Sodium elevated, one incident of coliform violation.
Lakeside Water Company	CWC - Guilford Chester Division	27					No problems indicated.
Leetes Island	CWC - Guilford Chester Division	40					Dug well, color violations, nearby septic systems.
Legend Hill Condos	CWC - Guilford Chester Division	270					Elevated sodium.
Lorraine Terrace	Middletown Water Dept.	20					No problems indicated.
Meadowbrook Rest Home	CWC - Guilford Chester Division	30					High copper levels, pH adjustment provided.
Mount St. John School	CWC - Guilford Chester Division	144					No problems indicated. provides emergency backup

[redacted]

[1,2]See footnotes at end of this table.

TABLE 7-4 (Cont)
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA[1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Nod Hill Apartments	CWC - Guilford Chester Division	30	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Northford Glen Condos	SCCRWA	84					Recent high levels of nitrate and sodium.
Our Lady of Grace Monastery	CWC - Guilford Chester Division	45					Elevated sodium.
Quonnipaug Park Water Supply	CWC - Guilford Chester Division	456					No problems indicated.
Ridgewood Hill Condos.	CWC - Guilford Chester Division	72					No problems indicated.
Rivercrest Water Company	Portland Water Department	72					Bacteria levels high at times.
Sugarloaf Elderly Housing	Amston Beseck Water Company	40					No problems indicated.

[1,2]See footnotes at end of this table.

TABLE 7-4 (Cont)
UTILITIES POTENTIALLY
REQUIRING SATELLITE MANAGEMENT
IN SOUTH CENTRAL AREA[1]

Name of Utility	Adjacent Exclusive Service Area	1987 Population Served	Single Source Supply	Fire Protection Capacity	Adequacy of Supply[2]	Emergency Power Availability	Water Quality Status
Twin Maples Nursing Home	CWC - Guilford Chester Division	50	[redacted]				[redacted]
West Lake Nursing Home	CWC - Guilford Chester Division	75					No problems indicated except elevated sodium in one well.

[1]Utilities currently under satellite management are not listed (see Table 6-2).

[2]Adequacy of supply is based on a comparison of existing available supply to current daily demand.

The WUCC views the concept of satellite management favorably and can act in an advisory role for those utilities interested in satellite management. However, the incentives for managers to provide service should be clarified. Utilities in the South Central Area contemplating the use or provision of satellite management should consider the following:

- Small water utilities should review their future position, and coupled with any known deficiencies, decide if they should be a candidate for satellite management.
- The WUCC acts in an advisory role for those utilities interested in satellite management.
- Utilities, which have defined an exclusive service area that surrounds other small existing service areas, should review the services that they could offer, including management and technical assistance.
- Implementation of satellite management agreements are initiated as appropriate and as agreed upon by the manager and managed utility and within DPUC guidelines as required.

DPUC's regulations for issuing certificates of public convenience and necessity for small water companies provide a good framework for developing criteria for potential satellite managers. These regulations require that the applicant demonstrate financial, managerial, and engineering capabilities that are adequate enough to own and operate a new water company. In addition, the applicant must demonstrate these qualities prior to finalizing a satellite management agreement.

I. CONCLUSIONS

Regarding the potential for use of satellite management in the South Central Public Water Supply Management Area, the following conclusions are made:

1. Satellite management is a viable option in the State of Connecticut, and a desirable option in the South Central Area.
2. Approximately six individual utilities located in Guilford, Durham, Bethany, and Wallingford should be considered as a possible candidates for satellite ownership.
3. The types of satellite management should be reviewed prior to arriving at any decision.

4. In view of new Safe Drinking Water Act Amendments of June 1986, all water utilities, particularly small ones, should review their new responsibilities and associated costs.
5. Larger water utilities should review their ability to assist and be prepared to respond to requests for assistance by either the small utility or the state.
6. Satellite managers should meet the criterion described in Paragraph D of this document's "Satellite Management Criteria" section.

J. RECOMMENDATIONS

The following recommendations are made:

1. Water utilities should review their future position and determine if they should be a candidate for some type of satellite management.
2. Water utilities should review the management and other items which they can offer as satellite services and make DOHS aware of their willingness to provide these.
3. DOHS should be prepared to advise all WUCC's on federal and state regulations.
4. In coordination with DPUC regulations, DOHS should be prepared to provide guidance to water utilities who may be in need of satellite services.

VIII. MINIMUM DESIGN STANDARDS

The State of Connecticut Department of Public Utilities (DPUC) has included minimum design criteria as a portion of its recently published Final Regulations for issuing certificates of public convenience and necessity for the construction or expansion of small (less than 1,000 customers) water companies. They provide a good framework for all utilities within the Water Supply Management Area. Many larger utilities have their own minimum design standards. Those utilities which do possess their own more stringent or site specific standards, have the right to require customers to comply with their standards when constructing an extension to their existing system or service area. The new DPUC regulations (Section 16-262m-8, paragraph j-2) appear to support this contention by stipulating that the "specifications for materials, equipment, and testing shall be in accordance with...the specified water utility which will eventually own the system.." It is important for a utility to maintain consistency of design parameters throughout its service area in order to provide system integrity with continued expansion. This section recommends additional minimum standards where necessary, discusses their adequacy as a framework for general minimum design standards, and briefly reviews these criteria. The entire section of DPUC Regulations that deals with Design Criteria, Section 16-262m-8, is attached in the Appendix.

A. REVIEW OF DPUC CRITERIA

With several references to state regulations, AWWA standards, Department of Health Services standards and regulations, the Public Health Code, and the National Electric Code, the DPUC design criteria become fairly comprehensive in scope, and can serve as basic design guidelines for all water companies, regardless of size. However, case-by-case exceptions to these criteria should be made, if justifiable, particularly for larger utilities which do not fall under the jurisdiction of the DPUC regulations. Some specific examples of areas which should be subject to flexible interpretation include the following:

1. Average day and peak hourly demand different than those defined in the DPUC criteria should be acceptable if adequate historical information is available to justify a deviation (true for both large and small systems).

2. A 15 percent margin of safety between safe yield and average day demand may or may not be adequate for certain systems, and should be examined on a case-by-case basis to determine the true adequacy of the source and system.
3. Although a minimum of 150,000 gallons of atmospheric storage is mandated by DPUC for systems which provide fire protection, the per capita storage requirement of 200 gallons per residential customer should be subject to site-specific variation.
4. In order to avoid repumping, it may occasionally be cost-effective to exceed the maximum pressure of 125 psi specified in the DPUC regulations, with pressure regulators provided at individual service connections.
5. In special cases, it may be advisable to allow individual booster pumps to serve homes which are either an excessive distance from, or elevation above, the distribution system, subject to the following conditions:

   - The booster pump is needed as a temporary measure as a system is upgraded.
   - Properly installed and approved back flow preventers are provided, along with low water pressure cutoff switches.
   - If possible, the need for a booster pump should be noted on the legal description of the property.
   - System pressure not less than 25 psi.

6. Case-by-case flexibility should be granted for variations in minimum depth of cover, with depths of less than 4.5 feet allowable with proper protection and insulation.

A review of other generally accepted standards suggests some additions to the DPUC criteria. These additions include the following:

1. A 2- to 3-foot safety factor should be included for facilities above the 100-year flood level.
2. Sight glass gauges should be installed only on tanks that are protected from freezing.
3. Surface water intakes should be designed to allow selective withdrawal from multiple levels, with protection by coarse screens or racks on each intake; intake velocities should be less than 0.5 fps.

4. Status of remote pumping stations should be telemetered where possible to a central location; pressure gages should be required on the discharge line from each pump (again, some flexibility may be needed for smaller systems).
5. Minimum and maximum clearance to the ground of 12 and 24 inches, respectively, should be specified for overflow and drain pipes from storage facilities; provisions should be included to drain the storage facility without service interruptions; properly protected vents should be required; a maximum level variation should be required based on a case-by-case analysis.
6. Reference should be made to AWWA or Ten State Standards, where applicable for items such as flushing methodology at system dead-ends; minimum isolation valve spacing, pipe restraints at bends, tees, dead ends, etc.; and minimum acceptable classes of various materials.
7. Fire protection connections should be treated as system dead ends, with appropriate provisions made for regular flushing (further cross-connection control regulations on the fire protection connections will be forthcoming from DOHS).
8. Systems should be designed and installed to anticipate that fire protection will be required at some future time. Usually this means 8-inch or larger mains are required.

B. DPUC DESIGN CRITERIA

The Final DUPC Regulations were published by DPUC on September 28, 1987, and included design criteria as Section 16-262m-8. This section of the regulations begins by providing a summary of key definitions, and proceeds to identify criteria associated with facility location, design population and demand, water supply requirements, source protection, well construction, water quality, atmospheric storage tanks, on-site standby power, transmission and distribution systems, materials of construction, fire protection, service pipes (service connections), and pump house requirements. Key criteria of the regulations include the following:

Definition of Terms*

1. Average daily demand: representative 24-hour water usage computed at 75 gallons per person per day.
2. Peak hour demand: one-third of the average daily demand.

3. Safe daily yield of a water supply system: all water delivered to the system from all sources operating simultaneously at their individual safe yields for an 18-hour period.
4. Safe yield of a well: for unconsolidated aquifers, a site-specific determination based on the impact of dry period minimum water table elevations on the yield of the well and the impacts of decreased stream flow or pollutant induction; for confined or bedrock aquifers, 90 percent of the hourly yield for 18 hours per day, hourly yield based on a cone of depression* which holds stable for 24 hours (lower yields to be used if the calculated figures would cause unacceptable associated impacts or when records indicate the yield to be less than calculated).

***Note**

DPUC Terminology may need to be revised to ensure consistency with the 1986 Federal Safe Drinking Water Act Amendments.

Facility location

1. Above the 100-year flood plains and outside of the floodway boundary.
2. All chlorine storage and use areas at least 300 feet from any residence.
3. Not in an area subject to fires or other natural or manmade disasters.

Water Supply Requirements

1. The system's daily safe yield shall be at last 115 percent of the anticipated average daily demand.
2. Must meet average daily demand with largest well or pump out of service.
3. Must subject all wells to a 72-hour yield test in which drawdown is to a stable level for at least 24 hours.
4. For a system utilizing only groundwater supplies, a minimum of two well sources shall be provided.

Source Protection

1. Minimum distances to septic systems, buried oil tanks, sanitary or storm sewers, surface waters, drains, and miscellaneous pollutant sources must be maintained; separation distances required increase as well capacities increase, with greater distances required for high-rate gravel-packed wells with high bedrock levels and soil percolation rates.

2. Sanitary conditions within minimum distances must be under control of water supply owner or other arrangement approved by DOHS.

Well Construction and Water Quality

1. Well construction must be in accordance with Public Health Code Regulations 19-13-B51 and Regulations of CT State Agencies Section 25-128-1 thru 25-128-64.
2. Quality of the source must conform to state requirements, with suitable treatment provided if necessary.
3. Each well must be equipped with a level probe, low water level pump shutoff, and lightning protection devices.

Atmospheric Storage Tanks

1. Shall be equipped with bolted entry hatches, capped and locked filler pipes, sight glass gauge, screened vent pipe, high and low water signal system, and a drain valve with discharge to the ground (not to sanitary sewer).
2. Capacity equal to the greater of 200 gallons per residential customer or the system's average daily demand, with allowances made for commercial and industrial demand.
3. Hydropneumatic tanks and transfer pumps shall be sized to accommodate peak hourly demand; at least two transfer pumps operating alternately must be installed between the atmospheric and hydropneumatic tanks, each capable of pumping the peak hourly rate and each protected by low water shutoff controls.
4. The usable volume of the hydropneumatic tank shall allow for storage of 5 minutes discharge from the largest transfer pump.

On-Site Stand by Power

1. Wherever possible, there should be a permanent or portable generator to power the largest well pump, one transfer pump, all booster stations, and all treatment systems.
2. Fuel storage shall be above ground with full containment.

Transmission and Distribution System

1. Minimum distribution pipe, if fire protection is not provided, shall be 6 inches; smaller diameters permitted in cul-de-sacs or areas where the system cannot be extended.
2. The distribution system shall be of adequate size and design to maintain minimum operating pressures.

3. All distribution mains to be installed within paved rights of way to facilitate access.
4. Normal operating pressures shall be between 35 and 125 psi at service connections.
5. Insofar as practicable dead-ends are to be avoided, with adequately sized blow offs installed if a dead-end is necessary.
6. Sufficient isolation valves shall be provided to facilitate repairs and flushing and installed on all connecting mains.
7. Customer booster pumps are prohibited except in extreme circumstances.
9. Air relief valves or hydrants and piping shall be provided at system high points and protected from flooding or contamination.
10. All appurtenant structures such as chambers, pits, etc. should drain to the ground surface or to underground absorption pits.
11. Pipes must be laid with a minimum cover of 4.5 feet (deeper if greater frost penetration is expected), provided with freezing protection at aerial crossings, and kept clean during installation; trenches must provide suitable bedding for at least six inches below the pipe invert, be kept as free of water as possible, continuously and uniformly backfilled in tamped layers of a height great enough to protect the pipe, covered overnight or when work is halted (with the pipe plugged).
12. Whenever possible, water and sewer lines (sanitary and storm) shall be located in separate trenches at least 10 feet apart. Where laid in the same trench, the water pipe shall be laid on a shelf at least 18 inches above the sewer pipe and at least 12 inches, but preferably 18 inches, horizontally from the side of the sewer pipe. The horizontal separating distance between a sanitary sewer manhole and a water line shall be 10 feet.
13. Where water and sewer lines cross, a minimum vertical distance of 18 inches shall be maintained between the water and sewer line with the sewer at the lower elevation. At crossings, pipe joints shall be spaced as far from the crossing as possible.
14. For force sewer lines there shall be no deviation from the 10-foot horizontal separation and the 18-inch vertical separation distances.

Materials

1. In general, AWWA standards must be met for all materials, coatings, equipment, installation, and testing.
2. Tracer wires must be used with nonmetallic pipe.

3. All facilities must be disinfected and tested to meet appropriate pressure and leakage requirements before being put into service.

Fire Protection

1. Requirements for fire protection shall be set on a case-by-case basis and shall be in accordance with DPUC and the applicable water utilities recommendations.
2. No fire hydrants will be permitted unless the community system has at least 150,000 gallons of water in atmospheric storage.

Service Pipes

1. Minimum size = three-fourths inch; depths similar to distribution requirements.
2. Separate fire service connection shall be provided to the customer's place of consumption.
3. Direct service to be provided from the water main without crossing intervening properties.
4. Shutoff valves to be provided at property line and interior of premises.
5. No interconnection between public supply and any other supply unless approved by DOHS per Section 19-13-B37(a) of the Public Health Code.

Pumphouse Requirements

1. Facilities shall be designed to prevent rodents, small animals and unauthorized persons from entering.
2. All manual and automatic controls, wiring and appurtenances are to be installed in accordance with the National Electrical Code and provided with suitable over and under voltage protection.
3. Easily read instantaneous and totalizing meters shall be installed to measure each source of supply independently.
4. Water treatment when required, shall be installed in accordance with procedures established by DOHS.

C. IMPACT ON EXISTING SYSTEMS

Concern has been expressed by some WUCC members that the criteria set forth in the new DPUC regulations (Section 16-262m-1 to 16-262m-9) could have a significant impact on smaller systems if they desire to expand. This concern is specifically related to whether an entire system would have to be brought up to the minimum design criteria if expansion occurs, even if the water utility has provided an adequate supply of water at sufficient

pressure to the customers. DPUC has stated that it is their intent to review an entire existing system for conformance to the regulations if expansions of five percent or more are contemplated by a regulated water company, with particular emphasis during this review on whether or not the proposed expansion will compromise existing service under any potential average or peak demand conditions. The regulations do allow for a hearing process for aggrieved parties with which situations such as this could be addressed. Clearly, it is the intention of the regulatory agencies that small systems be in compliance with minimum design criteria prior to or in conjunction with any expansion of the system.

D. CONCLUSIONS AND RECOMMENDATIONS

The new DPUC regulations for issuing certificates of public convenience and necessity for small utilities sets forth minimum design criteria under Section 16-262m-8. These criteria, as modified by the WUCC, provide an excellent framework from which to build the design standards for both small and large utilities. These criteria have the advantage that they are set in law, and are thus legislatively supported.

It must also be made clear that individual utilities have the right to impose their own standards within their existing or exclusive service areas. Furthermore, it is also important that the regulatory agencies support those individual utilities.

IX. FINANCIAL DATA

Section III concerning Alternative Water Resources presents options for future sources of supply as presented by the larger utilities in their individual water supply plans. Table 9-1 lists estimated capital costs associated with those projects that are currently contained within these utilities' 50-year plans of development. The estimates were obtained from the individual water supply plans and through inquiries to the various utilities. Costs to be incurred early in the planning process, within less than 5 years, have been estimated in some detail. However, estimates tend to become more speculative as they progress farther into the planning period. These latter estimates are, therefore, for conceptual purposes only and may change significantly as design details and future constraints become more fully known. Some of the alternative resource options do not appear in Table 9-1, as there is insufficient information available to make any reasonable estimates and/or these considerations are beyond the 50-year planning period.

The capital costs contained within Table 9-1 for new source development and/or treatment considerations are significant. However, over the payback period, their impact to the annual budget will likely be overshadowed by inflated operation maintenance, repair and upgrading costs. Therefore, effective financial planning and management by utilities should accommodate these inflated costs and also provide for sufficient additional funds for principal and interest capital project costs.

There are a variety of available financing mechanisms including bonding, capitalization of improvements, and sale of assets. The appropriate financing options for each particular utility's need will be influenced by the size and structure of the organization. Within the South Central Connecticut Water Supply Management Area, a variety of utilities exist in terms of size and structure. These range from small adjunct facilities for residential or multi-family complexes to larger municipal utilities, regional water authorities, and investor-owned water supply companies. The small water suppliers serving limited residential clients may charge an annual fee which covers only current water supply service costs. These fees are not designed for equipment replacement or capital expenses. Municipal utilities frequently finance operating expenses and costs of debt through their rate structures, with significant long-term capital improvements typically financed through bond sales. However, since a municipality may provide a number of public services

TABLE 9-1
ESTIMATES OF PROPOSED CONSTRUCTION PROJECTS WITHIN THE 50-YEAR PLAN
(IN 1989 DOLLARS)

Utility	Project	Capital Costs 1992	2000	2030
Connecticut Valley Hospital	- System Improvements	840,000		
Connecticut Water Company	- Beacon Valley Brook Diversion	600,000		
	[redacted]	60,000		
		5,570,000		
		2,900,000		
			2,100,000	
			2,500,000	
		1,200,000		
			1,400,000	
Cromwell Fire District		105,000	400,000	400,000
Heritage Village		250,000		
Meriden Water Department				500,000
	rs	800,000		
		110,000		
		650,000		
		750,000		
Middletown Water Department			225,000	
				7,100,000
		1,100,000		

TABLE 9-1 (Cont)
ESTIMATES OF PROPOSED CONSTRUCTION PROJECTS WITHIN THE 50-YEAR PLAN
(IN 1989 DOLLARS)

Utility	Project	Capital Costs 1992	2000	2030
Portland Water	- Develop Strong Ave. Well Field & Treatment Plant		3,000,000	
	- Reopen [redacted] w/wtp			3,000,000
SCCRWA	- [redacted]	1,100,000	22,900,000	
	- [redacted]	800,000		
Wallingford	- Durham Area Diversion			NA
	- Muddy River Aquifer		750,000	
	- Tyler Mill Reservoir		2,000,000	
	- Distance WTP & Supply Improvements	19,900,00		

that are financed through bond sales, there is always a possibility for competition within the municipality on how general obligation bond money is to be used. This problem is sometimes addressed by issuing revenue bonds rather than general obligation bonds. However, revenue bonds are often issued at a higher interest rate than general obligation bonds, which creates a higher water rate increment and makes them less attractive financially. An investor-owned organization must have a rate structure that will provide a positive rate of return on investment and that provides for capitalization of future development and improvements within the Public Utilities Commissions purview.

Table 9-2 presents a variety of financing options that were identified for consideration in the individual water supply plans. These options range from internally generated funds from net income, depreciation, and sale of company assets, to a number of external sources, such as taxable and tax exempt bonds, notes, federal and state grants, and loans. All of the projects anticipated during the 50-year planning period could selectively be financed by these standard and accepted methods of financing. It should be noted that two water companies within the South Central Connecticut Water Management Area are currently for sale. These are Heritage Village and the Beseck Lake Water Company. The sale of these utilities may alter their financial structures and the financing options available to them.

As discussed in other sections of the Integrated Report, one of the first options for supplemental or replacement sources considered by smaller utilities, is interconnections with larger utilities. These small companies still need to identify and plan long-term capital financing options to meet their individual needs. An example of special funding programs possible for the small supplier is that developed by the New Jersey Department of Environmental Protection (NJDEP). The NJDEP has established programs of low interest loans having an annual interest rate of 4.5 percent and maturity periods of 10 to 20 years. These programs are designed to provide financial assistance for repair and rehabilitation of water supply transmission facilities and interconnections, and for the construction of new interconnections. An additional example of a special funding program for small utilities is Connecticut's Public Act 85-483, an Act Concerning Water Supply Emergency Assistance Grants. This act authorizes up to $700,000 in bonds for water supply emergency grants for private water utilities serving between 25 and 1,000 customers. These funds are for repair, rehabilitation, interconnections, or replacement of facilities or equipment. Financing options, such as these,

TABLE 9-2
FINANCING OPTIONS IDENTIFIED BY LARGE WATER SUPPLY COMPANIES

Ansonia Derby

- Internally generated funds from depreciation and amortization
- Sale of company-owned land associated with abandoned sources at:

  Great Hill Reservoir (not currently approved for abandonment)
  Fountain Lake
  Bungay Reservoir
  Upper Sentinel Hill Reservoir
  Lower Sentinel Hill Reservoir

Connecticut Valley Hospital

- All funds for projects and improvements pertinent to the water supply system will be allocated by the State of Connecticut.

Connecticut Water Company

- Equity financing
- Long-term dept

  1. Promissory notes on 1st mortgage bonds, taxable
  2. Promissory notes on 1st mortgage bonds, tax exempt

- Internal sources including:

  1. Net income
  2. Depreciation net of dividends paid

- Interim loans
- Maturity of investments
- Rate increases

Cromwell Fire District

- Issuance of long-term bonds
- Tax revenues
- Changing rate structure
- Instituting impact fee

TABLE 9-2 (Cont)
FINANCING OPTIONS IDENTIFIED BY LARGE WATER SUPPLY COMPANIES

Heritage Village

- Water sale revenues
- Sewer charges
- Connecticut Development Agency low interest loans

Meriden Water Department

- Issuance of general obligation bonds and notes
- Increase in water usage charges

Middletown Water Department

- General obligation bonds
- Rate and fee structure increases to match required funds

Portland Water Works

- Revenue bonds
- State and Federal grants and loans

SCCRWA

- Revenue from internally generated funds in excess of current operations and investment requirements
- Issuance of bonds
- Sale of land not essential for water supply protection

Wallingford

- Revenue bonds
- General obligation bonds
- State and Federal grant and loan funds
- Sale of nonessential land
- Rate increases

could be pursued by these small suppliers. Similar programs for larger utilities willing to incorporate these smaller utilities with their assets and liabilities, should also be considered. Therefore, utilities should continue to work with appropriate government officials to identify and design financing options to help meet the needs of water supply entities within the South Central Connecticut Area. Other financing options for consideration and evaluation include:

- Grants providing 100 percent funding
- Lesser percentage grants supplemented with loans
- Larger utility financing of small utility's costs with a negotiated payback
- Low or no interest revolving state loan funds with repayed funds being set aside for future availability for other utilities.

APPENDIX

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC UTILITY CONTROL

DEPARTMENT OF PUBLIC UTILITY CONTROL REGULATIONS FOR APPLICATION PROCEDURES AND CRITERIA FOR ISSUING CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY FOR SMALL WATER COMPANIES

FINAL REGULATIONS

EFFECTIVE SEPTEMBER 28, 1987

One Central Park Plaza • New Britain, Connecticut 06051

An Equal Opportunity Employer

The Regulations of Connecticut State Agencies are amended by adding Sections 16-262m-1 to 16-262m-9, inclusive, as follows:

Section 16-262m-1. Definitions

(a) "Community Water System" or "System", as used herein, shall mean a system which supplies to the public piped water for human consumption, if such system has at least fifteen and no more than two hundred fifty service connections or regularly serves an average of twenty-five to one thousand persons daily at least sixty days out of the year, when such water is supplied as part of a lease or contract. A community water system includes but is not limited to, (1) any collection, treatment, storage, and distribution facilities under control of an operator of such system and used primarily in connection with such system, and (2) any collection or pre-treatment storage facilities not under such control which are used primarily in connection with such system. Community water systems may include, but are not limited to service to: residential sub-divisions, cluster-housing projects, homeowners associations, municipalities, tax districts, duplexes, townhouses, apartment buildings or complexes, residential and office condominium developments, elderly housing projects, convalescent homes, trailer or mobile home parks, industrial parks, shopping centers or malls, large manufacturing buildings and other commercial enterprises.

(b) "Feasible Interconnections", as used herein, shall mean that the extension of an existing utility's water mains is considered feasible to serve a proposed project with at least fifteen service connections or twenty-five persons if the developer's investment for such extension, including service connections and appurtenances, is less than $5,000 (construction costs only) per dwelling or office unit and if there is sufficient supply and storage facilities to accommodate the anticipated demand available from the existing utility. If there is insufficient supply and storage available from the existing utility, the cost of developing such facilities may be included in the water main extension proposal, as additional items.

(c) "Duplication of Water Facilities" as used herein, shall mean that plant and equipment of a community water system which the Department of Public Utility Control determines is substantially repetitive to the plant and equipment of another water purveyor or community water system within one linear mile of the proposed project, as measured along public or private roadways. Geological factors such as elevation differences, slope of the land and depth to bedrock will be considered in determining duplication of facilities.

(d) "Expansion", as used herein, shall mean the following: (1)a five percent increase in the number of service connections to be served by a community water system, above the number allowed under an existing certificate or permit issued by the Department of Public Utility Control and the Department of Health Services, or (2)a five percent increase in the number of service connections to be served by a community water system above the number served as of the effective date of these regulations.

(e) "Phase I-A, Phase I-B and Phase II", as used herein, shall mean the three parts of the application and review procedure for the construction or expansion of any community water system.

Phase I-A grants the developer approval of his well sites and permission to obtain the well drilling permits from the appropriate town to proceed with groundwater exploration and development of such wells. The issuance of this approval means that the Department of Public Utility Control and the Department of Health Services have determined that a main extension to an

existing system is not feasible (for new water systems only) and that there will be no duplication of service of other existing water utilities in the area when the project is finished. Phase I-B evaluates the well yield and water quality data so that proper pump sizing, storage and appurtenant equipment and any required treatment processes can be incorporated into the design of the water system. This approval permits the developer to obtain building permits from the town to clear the site, lay out the roads, construct the drainage facilities and dig or pour the foundations of the buildings themselves. Phase II Approval, the final Certificate, permits the developer to go forward with the remainder of the project, i.e. installing the water distribution system and waterworks (storage tanks, transfer pumps, meters, etc.) and the septic or sewer systems (assuming appropriate approvals have already been obtained from the Department of Health Services or local Directors of Health or Department of Environmental Protection) for the septic or sewer systems and the diversion of water.

(f) "Service Connection", as used herein, means the service pipe from the main to the curb stop, at or adjacent to the street line or the customer's property line.

(g) "Customer", as used herein, means any person, firm, corporation, company, association, governmental unit, lessee who by the terms of a written lease is responsible for the water bill, or owner of property furnished water service by a water company.

(h) "Existing System", as used herein, shall mean a regulated public service or municipal utility or regional water authority having an operating water system within one linear mile of the proposed project as measured along public and private roadways.

(i) "Satellite system" as used herein, shall mean a non-connected community water system of an existing system.

(j) "Regulated Public Service Utility", as used herein, shall mean a water company, as defined in Section 16-1 of the General Statutes of Connecticut, that is under the jurisdiction of the Department of Public Utility Control.

Section 16-262m-2. Chronological Application Procedures

The following procedures for applying for and issuing certificates of public convenience and necessity shall be followed by any applicant for a certificate of public convenience and necessity in accordance with General Statutes of Connecticut Section 16-262m, and by the Department of Public Utility Control, the Department of Health Services, and any other participant in the proceeding on such an application:

(a) The Department of Public Utility Control may conduct a pre-application conference with any potential applicant.

(b) (1) The applicant shall submit three (3) originals of the application for approval under Phase I-A, Phase I-B, or Phase II to the Department of Public Utility Control's Engineering Division in the format prescribed by the Department of Public Utility Control.

(2) An application fee of $100.00 shall be enclosed with the initial application when it is submitted to the Department. Checks shall be made payable to the Treasurer of the State of Connecticut. Payment of only one (1) fee shall be required per application, even if the application is submitted in separate phases. An applicant whose

application is rejected or denied will be required to pay a separate fee for any application subsequently resubmitted. An applicant may elect to submit Phase I-A, Phase I-B and Phase II data of the application simultaneously, but each Phase will be reviewed separately.

(c) The Department of Public Utility Control will forward one copy of the application for approval under Phase I-A, Phase I-B and Phase II to the Department of Health Services, notifying it that processing and reviewing should begin. The Department of Health Services should conduct well site inspections upon receiving notice from the Department of Public Utility Control that the Application is considered complete and an interconnection has been found not to be feasible.

(d) The Department of Public Utility Control shall review each phase of the application preliminarily for completeness and either accept or reject the application, or specify the additional information required. The Department of Public Utility Control shall notify, in writing, any applicant and the Department of Health Services of the Department of Public Utility Control's decision to accept or reject the application or to require additional information. Upon completion of review of each phase of an application, the Department of Health Services shall forward its approval or denial in writing to the Department of Public Utility Control.

(e) (1) The Department of Public Utility Control and the Department of Health Services shall simultaneously review each phase of the application on its merits, and either recommend approving or denying the application's request.

(2) The Department of Public Utility Control and the Department of Health Services may consult with each other and with the applicant to modify the application prior to such approval or denial, providing all modifications are confirmed and submitted in writing by the applicant.

(f) Upon the joint approval of any phase of the application by the Department of Public Utility Control and the Department of Health Services, the Department of Public Utility Control shall issue a letter of approval for that phase of the project.

(g) Upon the joint agreement between the Department of Public Utility Control and the Department of Health Services, the two agencies shall issue the Certificate pursuant to General Statutes of Connecticut Section 16-262m. If either Department finds reason for denial of a Certificate, no Certificate shall be issued.

(h) Any applicant issued a certificate under Phase II shall submit one (1) copy of as-built plans, certified by a professional engineer registered in the State of Connecticut, each, to the Department of Public Utility Control, to the Department of Health Services, to the specified owner of the water system, and to the town in which the project is located. These as-built plans shall be submitted to the respective parties no later than ninety (90) days from the completion of the construction.

(i) The Department of Public Utility Control and the Department of Health Services shall complete its review of each phase of the application in accordance with the schedule set forth below:

(1) Phase I-A reviews shall be completed within sixty (60) days of the Applicant filing the information specified in Section 16-262m-5 herein, with the Department of Public Utility Control;
(2) Phase I-B reviews shall be completed within thirty (30) days of the Applicant filing the information specified in Section 16-262m-6 herein, with the Department of Public Utility Control;
(3) Phase II reviews shall be completed within sixty (60) days of the Applicant filing the information specified in Sections 16-262m-7, 16-262m-8 and 16-262m-9 (if applicable) herein, with the Department of Public Utility Control;
(4) If the Applicant elects to submit Phase I-A, Phase I-B and Phase II data of the application simultaneously, each phase will be reviewed separately as indicated in paragraphs 1, 2 and 3 above.

Section 16-262m-3. Application and Approval of Three-Phase Construction

(a) The application for a new system or for an expansion of an existing system which involves a new water source shall be submitted and reviewed in three phases, as Phase I-A, Phase I-B and Phase II. The same chronology and procedures established in Section 16-262m-2 shall be followed sequentially first for Phase I-A and subsequently for Phase I-B and Phase II. It is recognized that some applications for expansion may not require a Phase I-A or Phase I-B review. In such cases only a Phase II application shall be required.

(b) (1) The application for Phase I-A, shall identify items including, but not limited to, the following: (A) The feasibility of interconnection to an existing system; (B) the location and proposed construction of any source of supply; (C) the possible duplication of service and water facilities caused by the installation of the proposed system; (D) the name of an existing regulated or municipal water utility or regional water authority which will own, operate and maintain the final constructed water supply facilities if they are to remain as a non-connected satellite system;

(2) The Department of Public Utility Control and the Department of Health Services shall determine the issues in subparagraphs (b)(1)(A), (b)(1)(B), (b)(1)(C), and (b)(1)(D) in this subsection;

(3) If the Department of Public Utility Control and Department of Health Services jointly determine that the applicant meets the criteria reviewed under subdivisions (1) and (2) of this subsection, the Department of Public Utility Control shall grant approval of the Phase I-A application, in writing to allow the applicant to construct the source of supply proposed in the application. The applicant shall proceed to construct the source of supply in conformance with the application and any conditions set by the Department of Public Utility Control and Department of Health Services in the approval. Applicants proposing withdrawals in excess of 50,000 gallons of water from one or more wells joined in a system where combined maximum withdrawal exceeds 50,000 gallons of water during any twenty-four hour period must confer with the Department of Environmental Protection to determine appropriate water diversion permit requirements under Section 22a-365 of the General Statutes of Connecticut;

(4) Approval under Phase I-A shall not in and of itself guarantee the later issuance of a certificate of public convenience and necessity.

(c) (1) The application for Phase I-B shall identify items including, but not limited to, the following:

(A) well yield data for each well, based on a suitable yield test performed by a qualified well yield tester in accordance with the criteria set forth in section 16-262m-8 herein and Section 19-13-B51(K) of the Regulations of Connecticut State Agencies; and

(B) water quality data for each well as specified by the Department of Health Services.

(2) The Department of Public Utility Control and the Department of Health Services shall jointly evaluate the data in subparagraphs (c)(1)(A) and (c)(1)(B) in this subsection.

(3) If the Department of Public Utility Control and Department of Health Services determine that the applicant meets the criteria reviewed under subparagraphs (c)(1)(A) and (c)(1)(B) of this subsection, the Department of Public Utility Control shall grant approval of the Phase I-B application, in writing to allow the applicant to obtain building permits to perform the functions specified in section 16-262m-1(e). The applicant shall proceed with construction in conformance with the application and any conditions set by the Department of Public Utility Control and the Department of Health Services in the approval. Approval under Phase I-B shall not in and of itself guarantee the later issuance of a certificate of public convenience and necessity for the applicant.

(d) (1) After receiving approval to proceed with the various aspects of the project under subsection (c) above, an applicant shall submit an application under Phase II. This application shall demonstrate items including, but not limited to, the following:

(A) conformance of proposed construction with the Department of Public Utility Control's and Department of Health Services' engineering standards;

(B) conformance of proposed construction with all federal and state standards on water supply;

(C) the financial, managerial, and technical resources of the applicant and ability to maintain adequate service.

(2) The Department of Public Utility Control and Department of Health Services shall jointly evaluate the issues in subparagraphs (d)(1)(A), (d)(1)(B) and (d)(1)(C) of this subsection.

(3) If the Department of Public Utility Control and Department of Health Services determine that the application meets the criteria in subparagraphs (d)(1)(A), (d)(1)(B) and (d)(1)(C) of this subsection the Department of Public Utility Control and Department of Health Services shall jointly issue a certificate of public convenience and necessity to the applicant.

(4) The applicant shall notify the Department of Public Utility Control, the Department of Health Services and the specified owner of the water system when the construction of the pumphouse, distribution system and service lines commence so that a field inspection can be scheduled to witness the installation of such items and when construction is completed so that a field inspection can be scheduled to inspect the as-built facilities.

Section 16-262m-4. Options When Main Extensions are not Feasible

(a) In the event that the Department of Public Utility Control and Department of Health Services determine that a main extension is not feasible, i.e. that it is too costly to construct a main extension; and that no existing regulated public service or municipal utility or regional water authority is willing to expand or own, operate and maintain the final constructed water supply facilities as a non-connected satellite system, the applicant may pursue the following options:

(1) If an existing regulated public service or municipal utility or regional water authority is willing to provide satellite ownership and management services, but is unable to meet all the criteria described in Sections 16-262m-8 and 16-262m-9 herein, the Department of Public Utility Control and the Department of Health Services may waive specific criteria in writing, if it is deemed to be in the best interest of the public affected.

(2) The applicant may withdraw the application and request the town in which the project is to be constructed to determine if the town's zoning requirements will permit individual wells. If this proposal is acceptable to the town, the developer may change the configuration of the project in order to accommodate individual wells. This option is available to the applicant at any time and may be pursued without obtaining a Certificate of Public Convenience and Necessity.

(3) The applicant may continue forward with the application by sustaining the burden of proof that the entity that will own the water system has the financial, managerial and technical resources to operate the proposed water supply system in a reliable and efficient manner and will provide continuous, adequate service to the proposed consumers to be served by the system. The criteria for meeting this burden of proof is set forth in Section 16-262m-9 of these Regulations.

The above options must be pursued in the order presented, i.e. option three cannot be pursued until options one and two have been exhausted.

(b) Any party who is aggrieved such that a specific personal and legal interest of said party has been specially and adversely affected by the decision to approve, reject or modify the application for the issuance of a Certificate may request a hearing which will be held jointly before the Department of Public Utility Control and the Department of Health Services. Such appeal will be based on the Administrative record compiled by the Department of Public Utility Control and the Department of Health Services including such additional relevant evidence and testimony as the parties may submit.

(c) If a community water system, as defined in Section 16-262m-1(a) herein, is constructed without the required Certificate of Public Convenience and Necessity, the Department of Public Utility Control and the Department of Health Services shall notify the appropriate Town officials, of the Town in which the system is located, that such Town is responsible for the future operations of that community water system, in accordance with Section 8-25a of the General Statutes of Connecticut.

Section 16-262m-5. Components of the Application Under Phase I-A

Any application for Phase I-A shall include, but not be limited to, the following:

(a) exact legal name, address, and telephone number of applicant and name and title of contact person; in the event the applicant is a corporation, the applicant should also provide the names and addresses of the corporate officers;

(b) name, address, telephone number of proposed registered professional civil engineer who will have design and supervision responsibility for the construction of the system;

(c) a check for $100.00 payable to the Treasurer of the State of Connecticut;

(d) engineering data certified by a professional engineer registered in the State of Connecticut as follows:

(1) At a minimum, a site plan and specifications for any water sources which shall provide for adequate well location, adequate well construction procedures, and proper sanitary easements for the wells. There shall be at least two wells shown on the plan and a reserve site for additional wells, as needed.

(2) Plans showing the relationship of the proposed water system to the sanitary sewage and storm drainage facilities, and indicating the distances from the proposed wells; wetlands and watercourses, observation wells; contour lines, customer premises, and sanitary sewage, storm drainage and septic facilities;

(3) A minimum 8" square location plan map showing the location and extent of service areas of any existing community water system or other water purveyor within one linear mile of any portion of the proposed system and identifying all adjacent entities or property owners;(use a Scale 1" = 2000'). The map should also indicate any known probable future building areas (as filed with the Town Planning & Zoning Commission) which might reasonably be served by main extensions of the subject system;

(4) An evaluation of the quantity of water necessary to provide an adequate supply at required pressures to existing and projected customers, including probable future building areas, during periods of average and peak demands for at least 15 years after construction;

(5) Sanitary survey evaluation of pollution sources (present and past), such as, but not limited to: sanitary sewage, cemeteries, landfills, salt storage and commercial and industrial facilities, which might affect the groundwater quality;

(6) A description of the groundwater quality and subsurface soils as classified by the United States Geological Survey, for the project area;

(7) A plan for controlling pollution sources which might affect the wells;

(8) A description of the procedures, methods, schedule and location, for conducting required sampling, testing and reporting on yield testing and water quality;

(9) A topographical map showing the relationship and location of the proposed project to the surrounding area;

(10) A brief description of the water system project and operational layout;

(e) A letter from the town where the project is located indicating whether or not fire protection facilities are required to be included in the design of the water system. If fire protection is to be required, the letter from the town should indicate the number of hydrants required to serve the project as well as the minimum distance allowed between hydrants;

(f) letters from all regulated public service or municipal water utilities or regional water authorities within one linear mile of the applicant's project expressing willingness or unwillingness to serve as water supplier to the applicant's project. If a water utility expressed willingness to serve, the letter submitted shall include the proposed manner of service and cost, via main extension or satellite ownership. The letter shall discuss the alternative of the water utility owning and operating the system as a non-connected satellite system. The letter shall also include the linear footage, size of pipe, material, and cost of a main extension including service connections, if such extension were required to be constructed. It should also indicate whether additional supply, storage and booster facilities, and their related costs, are necessary for providing proper service;

(g) if the applicant's project is located in an area where there is an adopted coordinated plan, in accordance with Sections 25-33c to 25-33j, inclusive, of the General Statutes of Connecticut, the water utility expressing willingness to serve the applicant's project must do so, in conformance with the established plan with full regard to exclusive service areas and satellite ownership and management stipulations. If a water utility coordinating committee has been convened for the appropriate management area, but does not yet have an approved coordinated plan, the applicant should furnish a letter from the committee indicating that the project is conceptually agreeable to it.

Section 16-262m-6. Components of the Application Under Phase I-B

Any application for the issuance of a certificate of public convenience and necessity under Phase I-B shall include, but not be limited to, the following:

(a) A copy of the well drillers completion report for each well;

(b) A copy of the yield test results for each well indicating pumping rates, certified well yields and drawdown information;

(c) A copy of the water quality test results from samples obtained during the yield test;

(d) A signed agreement between the developer of the water system and the existing regulated public service or municipal water utility or regional water authority indicating that the final constructed

water supply facilities will be dedicated to that utility. With a regulated public service company such agreement will specify any refunds that the developer may be entitled to for each service connection made to the community water system. The utility will be expected to receive from the developer an itemized breakdown of the actual costs of the water system facilities so that proper accountability and rate-making treatments (if applicable) can be afforded to the utility by the Department of Public Utility Control.

(e) The requirements of Section 16-262m-9 shall be addressed in Phase I-B.

Section 16-262m-7. Components of the Application Under Phase II

Engineering data certified by a professional engineer registered in the State of Connecticut as follows:

(a) Plans and specifications for the project must include but not be limited to: transfer pumps, well pumps and pump curves, hydropneumatic tanks, treatment facilities, distribution system layout, atmospheric storage facilities, metering (each source and customer), location of sample taps, on-site standby power, presence of emergency alarms, location of pressure gauges, location of gate valves and blow-offs, water level gauges on storage tank, fire protection (if necessary), and disinfection procedures;

(b) A hydraulic gradient of the proposed system;

(c) A detail of a typical service line, service connection, thrust block installation, hydrant installation, cross-section of trench containing pipe, and a meter installation;

(d) A plan and profile drawing of the water main and all other underground utilities (sewer, gas, electric, telephone or cable television);

(e) Name, address, telephone number and title of proposed operator with day-to-day responsibility for system.

Section 16-262m-8. Design Criteria

All community water systems proposed for construction or expansion in accordance with Section 16-262m of the General Statutes of Connecticut shall be designed substantially in accordance with the technical standards enumerated herein.

(a) For the purposes of this Section and Sections 16-262m-5, 16-262m-6 and 16-262m-7 inclusive, the following definitions shall apply:

(1) "Anticipated Average Daily Demand" shall mean the estimated normal water usage of the system as determined for the most representative 24 hour period of record not affected by unusual demand conditions such as drought or a significant temporary increase in demand;

(2) "Peak Hour Demand" shall mean largest hourly volume of water consumed and shall be considered 1/3 of the average daily demand;

(3) "Design Population" shall mean the estimated number of people per service connection, calculated as follows, unless specific circumstances dictate otherwise:

Type of service	Design Population Per Service Connection
Single family dwelling (Over 3 bedrooms add 1 person per additional bedroom)	4
Multi-dwelling (i.e. apartments, elderly housing, duplexes, townhouses and residential condominiums	
One bedroom unit	2
Two bedroom unit	3
Three bedroom unit (over 3 bedrooms add 1 person per additional bedroom)	4
Mobile Homes or Trailers	2.5
Convalescent Homes	Use Number of beds
All other components described in 16-262m-1(a)	Use Estimated Population

(4) "Safe Daily Yield of a Water Supply System" shall mean the amount of water which can be delivered to the system from all the system sources at the safe yield rate simultaneously in an 18 hour period expressed in gallons per day;

(5) "Safe Yield of a Well" shall be calculated as follows: (A) Unconsolidated aquifer ground water sources. The safe yield shall be based on an analysis of the impact of minimum water table elevations projected in a dry period on the yield of the well(s) and an analysis of critical impacts such as decreased stream flow or induction of pollutants. (B) Confined and bedrock aquifer ground water sources. Safe yield shall be equal to 90% of the hourly yield of the well multiplied by 18 hours of pumping per day except that the safe yield may be less when utilization of this yield will have unacceptable impacts or when historical reports or other information indicates that the safe yield is less. Hourly well yield shall be based on a pump test during which the cone of depression caused by the pumping of the well shall be stabilized for at least 24 hours;

(6) "Source" shall mean any Department of Health Services approved well, spring, reservoir or other location where water is siphoned, pumped, channeled or drawn for use in a potable water supply;

(7) "Source of Pollution" shall mean any place from which stems or condition which may cause pollution of a ground or surface water supply. It may include but not be restricted to a watercourse including any stream, pond, lake or river; privy; subsurface sewage disposal system; cemeteries; sanitary landfill; sewage lagoon; industrial waste disposal location; sanitary or storm sewers; or a buried oil or gasoline storage tank;

(8) "Well Pump Capacity" shall mean the maximum quantity of water the well pump can supply under normal operating conditions. The pump capacity shall not exceed the safe yield of the well;

(9) "Yield of a Well" shall mean the amount of groundwater which can be withdrawn from a well as determined by the yield test. The yield of a well is expressed as gallons per minute (gpm);

(10) "Service Pipe", as used herein shall mean the pipe that runs between the curb stop, at or adjacent to the street line or the customer's property line, and the customer's place of consumption.

(b) Facility location. These include such items as, but not limited to, treatment plants, pumping stations, storage tanks, etc., but do not include water intakes and connecting pipelines.

New facilities are to be located: (1) Above the level of the one hundred year flood and not within the floodway boundary as established on flood boundary and floodway mapping prepared pursuant to the federal flood insurance program; (2) Where chlorine gas will not be stored or used within three hundred feet of any residence; and (3) Where the facility is not likely to be subject to fires or other natural or manmade disasters.

(c) The following equations are to be used when determining the design population and water demand of the community water system. Where unusual circumstances exist, the Department of Public Utility Control and Department of Health Services will determine the appropriateness of these equations.

(1) Design Population Served = number of service connections x number of people per service;

(2) Average Daily Demand = population served x 75 gallons per person per day;

(3) Peak Hour Demand = average daily demand x 1/3.

(d) Water Supply requirements:

(1) Each community water system shall be designed to furnish and maintain sufficient facilities to provide a continuous and adequate supply of water; and there shall be at least a 15% margin of safety maintained between the system's safe daily yield and anticipated average daily demand. Unless other acceptable provisions are made to assure continuous service, the community water system should be able to meet the anticipated average daily demand with its largest well and/or pump out of service;

(2) For a system utilizing only groundwater supplies, a minimum of 2 well sources shall be provided;

(3) All wells shall be subjected to a minimum 72-hour yield test, by a qualified well yield tester, such that at a constant pumped discharge rate, the drawdown level has stabilized for at least a 24-hour period. The pump must run continuously during the yield test for the entire 72 hour period irregardless of the anticipated well yield The following items must be recorded and measured during the test:

(A) Static water level before pumping;

(B) Date, time, pump rate and drawdown (at least hourly);

(C) Time and water levels after pump has been shut down until well has recovered;

(D) Each well shall have a drawdown curve plotted from the results of the yield test, with the tester's established safe daily yield at its stabilized drawdown certified and printed thereon. Suitable provisions shall be made in cases of wells that are located in close proximity to each other and subject to "interference." In such cases a simultaneous pumping of each well shall be required;

(E) Whenever possible, the pump test shall be performed during the summer months and should be conducted during a time period absent of precipitation or as reasonably close to non-precipitation as possible;

(F) Suitable provisions including data from observation wells shall be made in cases of wells located in close proximity to wetlands, drainage ways, or watercourses in order to quantify the effect of induced recharge on flows in such wetlands, drainage ways or watercourses;

(4) All wells, especially deep drilled rock wells, are subject to diminution of their yields after a period of time. Therefore, they should be periodically monitored for possible loss of yield, and scheduled for an appropriate maintenance program when conditions dictate. When new wells are added at a future date, especially in the vicinity of existing wells, suitable measures shall be taken to ascertain potential loss of yield from the adjacent wells simultaneously with the yield testing of the new wells;

(5) Reserve well site property is required and must be shown on the final map;

(6) There shall be a safe yield capacity sufficient to supply 75 gallons per person per day and at least 15% additional supply to maintain an adequate margin of safety and be able to accommodate adjacent growth in the future.

(e) Source Protection:

(1) The following minimum separating distances are required by Public Health Code Sections 19-13-B51 and 19-13-B103 (Technical Standards).

Item		Minimum Distances*		
		Under 10 gpm	10-50 gpm	Over 50 gpm
(A)	Septic system, buried oil tanks or other sources of pollution	75'	150'	200'
(B)	Cast iron sewer pipe or equivalent	25'	75'	100'
(C)	Surface water body or drain	25'	50'	50'

*Greater separating distances are required for gravel wells with pumping capacities greater than 50 gpm where ledge is found at less than 10 feet and/or the soil percolation rate is faster than 1 inch per minute at surrounding septic systems.

(D) Sanitary conditions within the radial separating distance required shall be under the control of the water supply owner by direct ownership, easement, or other arrangement approved by the Department of Health Services and detailed on the as-built map.

(f) Well Construction and Water Quality:

(1) Wells shall be constructed in accordance with Public Health Code Regulation 19-13-B51 and the Regulations of Connecticut State Agencies Sections 25-128-1 through 25-128-64, inclusive (Regulations of the Well Drilling Industry);

(2) The bacterial, physical, inorganic chemical, organic chemical and radiological quality of the source must satisfy the requirements of Public Health Code Regulation 19-13-B102 and the Connecticut Department of Health Services action levels for organic compounds. Suitable treatment may be required by the Department of Health Services;

(3) Each well shall be equipped with a water level probe for periodic drawdown measurement; and there shall be provided suitable low water level well pump shut-off and lightning protection devices in accordance with Section 19-13-B102(n) of the Regulations of Connecticut State Agencies.

(g) Atmospheric Storage Tank:

(1) The atmospheric storage tank shall be equipped with a properly bolted entry hatch to allow access for cleaning and painting of the tank and a filler pipe to provide for water to be trucked in. The filler pipe must be capped and locked. The tank shall also be equipped with a sight glass gauge, a screened vent pipe and a high and low water level signal system. There shall be a drain valve at the bottom of the accessible face of the tank. Drain lines must discharge to the ground. No direct connection to a sanitary sewer will be permitted;

(2) Atmospheric storage tank capacity shall be at least 200 gallons per residential customer or equal to the average daily demand of the system, whichever is the greater number. If commercial or industrial customers are included, additional storage shall be provided based on reasonable average day estimated water usage thereof;

(3) Hydropneumatic tank and transfer pumps:

(A) A hydropneumatic tank and transfer pump arrangement, used in tandem with the atmospheric tank, shall be sized to accommodate the peak hour demand. A minimum of two (2) transfer pumps shall be installed to operate alternately, each capable of providing water to the system at the peak hour demand rate; (B) The transfer pumps shall be installed between the atmospheric tank and the hydropneumatic tank; (C) The required gross volume of the hydropneumatic storage tank shall be calculated using the following equations:

Usable Volume = 5 minutes x largest transfer pump capacity (gpm)

$$\text{Gross Volume} = \frac{100\%}{\%\ \text{usable volume}} \times \text{Usable Volume}$$

(D) Transfer pumps shall be protected by low water level shutoff controls in the storage tank.

(4) All waterworks equipment shall be designed and installed so as to assure safe and easy access to the equipment for normal service and for repairs or replacement work.

(h) On-site Standby Power:

(1) Wherever possible, there shall be included on-site a permanently installed gasoline, propane-fueled, diesel, natural gas or oil fired generator capable of supporting at least the largest well pump, one transfer pump, any high service booster stations and all treatment systems simultaneously in the event of an electrical outage. Portable generators may be considered acceptable as an alternate to an on-site generator;

(2) Fuel storage shall be above ground, and provided with a containment area capable of holding the full volume of the fuel tank.

(i) Transmission and Distribution System:

(1) The transmission pipelines, (i.e. that pipe from the source of supply to the pumphouse or treatment facility or from the source of supply to the distribution system) from sources of supply shall be designed to deliver, in combination with related storage facilities and to the limits of the capacity of those sources of supply, the maximum requirements of that portion of the system which is dependent upon such transmission pipelines;

(2) The distribution system shall be of adequate size and design to maintain minimum normal operating pressures. Minimum distribution pipe diameter shall be 6 inches except in cul-de-sacs where the mains are not subject to being extended or as otherwise approved by the Department of Public Utility Control. If fire protection is to be provided, minimum distribution pipe diameter shall be 8 inches. All mains shall be installed in the rights-of-way of paved roadways to allow all weather access and to facilitate repairs;

(3) Normal operating pressures, including peak demand conditions in the distribution main shall be between 35 psi and 125 psi at the service connection;

(4) Where static pressures would exceed 125 psi, pressure reducing devices shall be provided on distribution mains;

(5) Insofar as practicable, the distribution system shall be designed so as to avoid dead ends in the mains. Suitable right-of-way easement control shall be provided to the proposed owner and operator and his assigns to permit future such extensions. Where a dead end line is to be used, an adequately sized blow-off shall be installed at the end of the line;

(6) Sufficient isolation valves shall be provided on water mains so that inconvenience to customers and sanitary hazards will be minimized during repairs and flushing. At intersections, valves shall be installed on all connecting mains;

(7) Customer Booster Pumps: No community water system shall be designed to furnish water service to any customer who must utilize a booster pump to pump water from the utility's water main into the customer's plumbing facilities in order to maintain a minimum 35 psi pressure service, except in extreme circumstances and when authorized by the Department of Public Utility Control. The system's gradient shall be designed to preclude this need under reasonable foreseeable conditions for the ultimate service area. Consideration shall be given both to deteriorating pipe conditions leading to increases in pressure losses in the mains and also to any potential hazard which might be created if contamination should be introduced into the system through a cross-connection when a negative pressure is induced in the water main by a customer's booster pump;

(8) Air Relief Valves: At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of hydrants or air relief valves. Suitable protection measures shall be included in the design to cover situations where flooding of the manhole or chamber may occur;

(9) Air Relief Valve Piping: The open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward-facing elbow. The pipe from a manually operated valve should be extended to the top of the pit;

(10) Chamber Drainage: Chambers, pits or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to any sewer. Such chambers or pits shall be drained to the surface of the ground where they are not subject to flooding by surface water, or to absorption pits underground;

(11) When installing pipe, care must be taken to keep the pipe clean. Trenches shall be kept as free of water as is possible;

(12) When laying of pipe is interrupted overnight or for any longer period of time, the open end of the pipe shall be plugged tightly and the open trench covered with wood or steel covers;

(13) Installation and pressure testing shall incorporate the provisions of the American Water Works Association Standards and/corresponding installation procedures;

(14) A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material, free of detrimental substances, shall be used. That backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. During pipe laying, stones, boulders and any other significantly detrimental materials found in the trench shall be removed for a depth of at least six inches below the bottom of the pipe;

(15) All pipe shall be provided with a minimum earth cover of 4.5 feet. When rock blasting is necessary, ample excess depth shall be provided to

allow for a suitable depth of bedding material between the pipe bottom and the rock base. Where frost can be expected to occur deeper than 4.5 feet, additional pipe cover shall be provided to suit. The mains should have adequate cover over the top of the pipe, using suitable backfill material, for protection against surface loads. For river or stream crossings where the water main may be exposed to the air, the water main shall be protected against freezing by an alternate means;

(16) Whenever possible, water and sewer lines (sanitary and storm) shall be located in separate trenches at least 10 feet apart. Where laid in the same trench, the water pipe shall be laid on a shelf at least 18 inches above the sewer pipe and at least 12 inches, but preferably 18 inches, horizontally from the side of the sewer pipe. The horizontal separating distance between a sanitary sewer manhole and a water line shall be 10 feet;

(17) Where water and sewer lines cross, a minimum vertical distance of 18 inches shall be maintained between the water and sewer line with the sewer at the lower elevation. At crossings, pipe joints shall be spaced as far from the crossing as possible;

(18) For force sewer lines there shall be no deviation from the 10 foot horizontal separation and the 18 inch vertical separation distances;

(19) When it is not possible to satisfy the requirements in paragraph (17) of this subsection above one or more of the following precautions may be approved by the Department of Health Services as acceptable alternatives:

(A) Sleeving of the sewer;
(B) Concrete encasement of the sewer;
(C) The use of a thicker-walled sewer pipe (pressure testing will be required);
(D) Concrete encasement of the water pipe;
(E) The use of thicker-walled water pipe;
(F) The design engineer may also propose other precautionary measures which will be subject to review and approval;

(20) The layout plan should provide for suitable ownership or easement control of the water supply operator to permit further extension of the piping, particularly where dead ends may occur and/or where expansion of the water system can be readily foreseen.

(j) Materials:

(1) Metallic and non-metallic materials may be used to construct component parts of a water system including, but not limited to, conduits, pipes, couplings, caulking materials, protective linings and coatings, services, valves, hydrants, pumps, tanks and reservoirs; provided:

(A) The materials shall have a reasonable useful service life;

(B) The material shall be capable of withstanding the internal and external forces to which it may be subjected while in service;

(C) The material shall not cause the water to become impure, unwholesome, nonpotable or unhealthful;

(D) Materials and equipment shall be designed and selected with factors of safety included and installed as to mitigate corrosion, electrolysis and deterioration. When the possibility of a near future interconnection with another utility exists, some components such as pressure tanks and compressors may be designed for limited service life;

(E) Use of non-metallic pipe shall require a suitable tracer wire for pipe location;

(F) No material shall be allowed which does not meet standards established by the American Water Works Association or other comparable standards;

(2) Specifications for materials, equipment, and testing shall be in accordance with all applicable American Water Works Association standards, the specified water utility which will eventually own the system, and the requirements of the Department of Health Services and the Department of Public Utility Control. Such Specifications shall include the following:

(A) Proper protection shall be given to metal surfaces by paints or other protective coatings;

(B) All paints, liners or coatings proposed for use in a water supply system that will come in contact with the potable water must be approved by the Department of Health Services. Following final curing, disinfection and dissipation of the chlorine residual, water samples must be collected and tested in accordance with Section 19-13-B102 of the Regulations of Connecticut State Agencies, for hydrocarbon, organohalide, inorganic chemical, physical, and total coliform analysis from a sampling point approved by the Department of Health Services. The results of these analyses must be reviewed and approved by the Department of Health Services both at the time of initial drilling of the wells and after the design and construction stages but before using the facility;

(C) Cathodic protection, when required, must be designed and installed by competent technically qualified personnel;

(3) Upon completion of the construction of the community water supply system, the well(s), storage tank(s), and appurtenances must be disinfected, in accordance with procedures established by the Department of Health Services;

(4) Prior to acceptance and use, the design engineer shall supervise appropriate pressure testing of all piping and tanks for leakage to assure specified standards are met.

(k) Fire protection: Whenever fire protection is required, the water system shall be designed and constructed in accordance with recommendations of the Fire Underwriter's Insurance Services Office, the Department of Public Utility Control and the specified water utility that will eventually own the water system. No fire hydrants shall be permitted unless the community water system has at least 150,000 gallons of water in atmospheric storage.

(1) Service Pipes:

(1) The size, design, material, and installations of the service pipe shall conform to the reasonable requirements of the utility that will eventually own the water system; provided, however, that the minimum size of the pipe shall be not less than 3/4-inch and that the use of non-metallic pipe shall include a suitable tracer wire for pipe location;

(2) All service pipes shall be installed below the frost line to prevent freezing;

(3) Service pipes shall not be connected to hydrant branch lines, and they shall not cross intervening properties even with the protection of easements. If fire protection to the customer's property is required, there shall be a separate service connection and separate service pipe paralleling the domestic service pipe to the customer's place of consumption;

(4) The service pipe shall be connected to a single-service corporation at the main, installed with a suitable gooseneck and be sufficiently flexible to prevent fracture from expansion or contraction. It shall be run perpendicular from the water main to the customer premises and be free from any tee, branch connection, irregularity or defect;

(5) The service pipe shall be installed with a suitable shutoff valve and curb box at the property line. There shall also be a suitable shutoff valve at the interior of the premises. In the case of service pipes dedicated for fire protection, there shall be a detector check meter installed on the pipe;

(6) No physical connection between the distribution system of a public water supply and any non-public water supply is permitted except as provided for in Section 19-13-B37 of the Regulations of Connecticut State Agencies;

(7) A separate service connection shall be required for any dwelling unit or office unit that is adaptive to individual ownership. Thus, an application for a Certificate of Public Convenience and Necessity for the following types of projects must include provisions for installing a separate service connection for each dwelling or commercial unit: residential subdivisions, including homeowners associations and municipal tax districts; cluster housing projects; duplexes; townhouses; residential and office condominiums; industrial parks; shopping centers or malls; trailer or mobile home parks; elderly housing projects and garden apartment complexes. Projects that may or may not require individual service connections, and subject to the Department of Public Utility Control's judgement, include high rise apartment complexes, multi-storied homes, commercial buildings and high rise condominiums;

(8) Each service connection shall be separately metered. The service line in each dwelling or office unit shall contain two ball valves and an American Water Works Association-certified meter adaptive to a remote reading device setting. The water utility which will eventually own the water system shall be responsible for providing the water meters to each customer premise at its own expense.

(m) Pumphouse requirements:

(1) Well pit and/or pumphouse construction shall be designed to prevent the entrance of rodents and other small animals. All facilities shall be locked and fenced and otherwise protected and secured to prevent entrance of unauthorized persons;

(2) Adequate drainage of all well houses and pits including the use of floor drains shall be provided as required in Public Health Code Regulation 19-13-B51h;

(3) Necessary electrical controls shall be installed to enable both manual and automatic operation of all pumps, motors and accessory equipment. All controls must be clearly labeled as to their function. All electrical wiring, controls and appurtenances shall be installed in conformance with the National Electrical Code;

(4) Flow meters capable of measuring totalized and instantaneous flow shall be installed to accurately measure independently each source of supply and their installation shall provide for ease of meter reading, repair and/or removal. Additional meters may be required where water treatment and/or other conditions dictate;

(5) Water treatment, when required, shall be installed in accordance with procedures established by the Department of Health Services;

(6) Smooth end (e.g. threadless chrome) sampling taps shall be installed on the discharge line of each well and at a representative point(s) off the discharge pipe(s) coming from the storage tank(s). Where treatment is used, taps before and after treatment facilities shall also be installed. Taps shall be at least 12 inches above the finished floor and any possible high water level. Taps must point downward;

(7) Suitable over and under voltage protection shall be provided on the various electrical equipment;

(8) The waterworks facilities shall be provided with suitable lighting, heat and ventilation. If necessary, a dehumidifier shall be used during summer operations;

(9) The pumphouse, wells and other plant facilities should be accessible to the various maintenance vehicles.

Section 16-262m-9. Financial, Managerial, and Technical Qualifications Criteria

(a) If the Department of Public Utility Control and Department of Health Services determined that a main extension is not feasible or no utility is willing to extend such main, and that no existing regulated public service or municipal utility or regional water authority is willing to own, operate and maintain the final constructed water supply facilities as a non-connected, satellite system, and if it is not feasible to install private individual wells, the applicant may continue forward with the application by satisfactorily providing the following additional information:

(1) A description of the applicant's business organization along with certified copies of the executed documents or any authority granted pursuant to Section 2-20a of the General Statutes of Connecticut;

(2) Certified copy of most current 12-month balance sheet and income statement of proposed owner of water system including a statement of current assets and liabilities;

(3) Copy of most current income tax return of proposed owner of water system;

(4) Indicated source of financial resources that would be used to fund the daily operations and any needed future capital improvements;

(5) Describe the financial ability of the proposed owner of the water system to provide a continuous, adequate and pure supply of water in routine and emergency situations including a pro forma cash flow statement for one year starting immediately after construction is completed;

(6) Describe the annual budget formulation process;

(7) Indicate the name, address, and qualifications of person/company who will be responsible for the budget preparation and administration;

(8) Describe the controls that will be in place to keep operations within budget and the sanctions or consequences that there will be for budget overruns;

(9) Indicate the name and address of person responsible for filing tax returns and annual audit reports;

(10) Indicate the name and address of person(s)/company(s) who will be responsible for routine operations including maintenance, customers billing and collections, repairs, emergency service and daily management;

(11) Describe the planning process to be implemented and assignment of responsibilities to provide for future needs of the customers including a program for routine system maintenance and the increase of future supplies as may be necessary;

(12) Describe the technical background and experience of the proposed operator including any membership in professional water industry organizations;

(13) Furnish a signed agreement or contract under which the proposed operator will serve, including guarantees of continuous long-term operation;

(14) Indicate the name and address of person/company who will manage the water system if different from operator;

(15) If there will be a business manager, in addition to the operator, describe his or her qualifications;

(16) Describe the governing board, its background in utility business governance and the decision making process of the management entity;

(17) List items which the operator will be responsible for and those which the manager will be responsible for;

(18) A plan for conducting cross-connection investigations including identification of the personnel capable of conducting cross-connection inspections;

(19) A plan (including the procedures, methods, schedule and location) for conducting required sampling, testing and reporting regarding: (A) water quality testing; (B) pressure testing; (C) production metering; (D) customer meter testing; (E) ground water monitoring purusuant to Section 19-13-B102(n) of the Regulations of Connecticut State Agencies;

(20) A plan for maintenance of the system;

(21) A plan for the maintenance of required records including at least:

(A) service area maps; (B) water quality, pressure, metering and other tests; (C) emergency procedures; (D) metering; (E) energy use; (F) chemical use; (G) water levels; (H) production and consumption; (I) customer complaints; (J) non-revenue water; (K) all financial records;

(22) A plan for operator safety;

(23) A plan for leak detection;

(24) A plan for long range conservation including supply and demand management practices;

(25) A plan for action and proper notification of authorities in the event of an emergency;

(A) As used above, "emergency" means any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought or fire, explosion, electrical outage, toxic spill or attack or series of attacks by an enemy of the United States causing, or which may cause, substantial damage or injury to civilian property or persons in the United States in any manner by sabotage or by the use of bombs, shellfire or atomic, radiological, chemical, bacteriological or biological means or other weapons or processes.

(26) Estimated itemized cost of water facilities to be constructed or expanded.

(b) In addition to the above requirements, the Department of Public Utility Control shall be furnished the proposed owner's plans for the following:

(1) Preparation of adequate rules and regulations for providing water service, including termination of customers for non-payment of bills;
(2) Preparation and administration of a proper metered rate schedule and the rates themselves;

(3) A procedure for handling customer complaints;

(4) A procedure for meter reading and accurate billing of customers;

(5) A listing in the local telephone directory of an emergency and general inquiry telephone number for the customers.

Purpose: The purpose of these regulations is to allow the Department of Public Utility Control and the Department of Health Services to implement jointly the provisions of General Statutes of Connecticut §16-262m, which was enacted to address the difficulties associated with the construction or expansion of small water systems, such as inadequate construction and financing, which ultimately leads to inadequate levels of service provided by such water companies.

These Regulations are intended to restrict the proliferation of new small water systems, to promote good public utility practices, to encourage efficiency and economy, to deliver potable water in accordance with applicable health standards, and to establish minimum standards to be hereafter observed in the design, construction and operation of waterworks facilities of new small water systems and on which existing community water systems should base their future plans should they choose to expand. The Certificate of Public Convenience and Necessity assures town governments that community water systems will operate in accordance with the general requirements and applicable minimum standards of Sections 16-11-50 through 16-11-97, inclusive and Sections 19-13-B32, 19-13-B51, 19-13-B46, 19-13-B47 and 19-13-B102 of the Regulations of Connecticut State Agencies.