



Coordinated Water System Plan
Part IV: Final Executive Summary
Western Public Water Supply Management Area
May 22, 2018



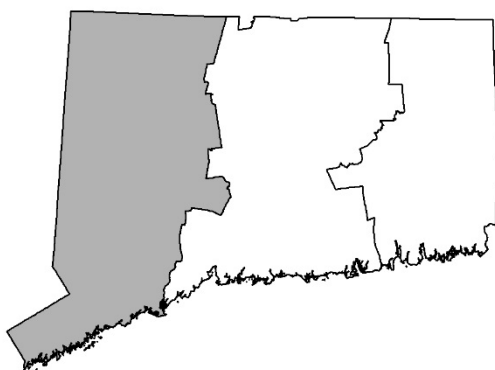
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Coordinated Water System Plan Part IV: Final Executive Summary

Western Public Water Supply Management Area

May 22, 2018



Prepared for:

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NOTICE TO READERS

This document was prepared under a grant from the United States Environmental Protection Agency (EPA) administered by the Connecticut Department of Public Health (DPH). Points of view or opinions expressed in this document are those of the Western Water Utility Coordinating Committee and do not necessarily represent the official position or policies of the EPA or the Connecticut DPH.

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This document could not be completed without the time and dedication of the Water Utility Coordinating Committee (WUCC) Officers and active WUCC membership, defined as those members who attended at least one Western WUCC meeting or provided written comments on the process.

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South Central Connecticut Regional Water Authority	Western Connecticut Council of Governments
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Southbury Training School	Wolcott Water Department

Other Meeting Attendees

The Western Connecticut WUCC also appreciates the time and effort of the numerous nonmembers who have attended at least one meeting and/or have contributed valuable insight to this process:

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Connecticut Department of Public Health	Pomperaug River Watershed Coalition
Connecticut General Assembly	RCAP Solutions
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TABLE OF CONTENTS

	<u>Page</u>
Notice to Readers	i
Acknowledgements	ii
Table of Contents.....	iv
Definitions.....	vi
Abbreviations.....	ix
SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS	ES-1
1.0 THE COORDINATED WATER SYSTEM PLANNING PROCESS.....	1
2.0 COMPOSITION OF THE EASTERN PUBLIC WATER SUPPLY MANAGEMENT AREA.....	3
3.0 SUMMARY OF THE WATER SUPPLY ASSESSMENT	4
4.0 EXCLUSIVE SERVICE AREA BOUNDARIES.....	6
5.0 POPULATION AND WATER SUPPLY DEMAND	9
6.0 POTENTIAL INTERCONNECTIONS, JOINT USE FACILITIES, AND SATELLITE MANAGEMENT	16
7.0 POTENTIAL WATER SUPPLY SOURCES	19
8.0 POTENTIAL IMPACT OF THE COORDINATED WATER SYSTEM PLAN ON OTHER USES OF WATER RESOURCES.....	20

LIST OF TABLES

Table ES-1	Prioritization and Implementation of Non-Capital Improvement Recommendations	ES-6
Table 1	Western PWSMA Towns	3
Table 2	Final Recommended Exclusive Service Area Holders in Western PWSMA.....	7
Table 3	Historical Population by Town for the Western PWSMA	9
Table 4	Population Projections by Town for the Western PWSMA	11
Table 5	Existing and Projected ADD, Available Water, and Margin of Safety for Exclusive Service Areas in Western PWSMA by ESA Holder.....	13
Table 6	Summary of Available Water Deficits to Meet MMADD for Community Water Systems ...	15
Table 7	Satellite Management Needs and Opportunities of ESA Holders.....	17

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF FIGURES

Figure 1	Population Growth by Town Classification: Western PWSMA	10
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LIST OF APPENDED FIGURES

Regional Map	Appended Figure 1
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LIST OF APPENDICES

Table of Contents for Part I, Part II, and Part III of the Coordinated Water System Plan.....	Appendix A
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DEFINITIONS

Areawide Supplement – A part of a coordinated water system plan that addresses areawide water system concerns pertaining to the public water supply management area that are not otherwise included in each water company's individual water system plan. The supplement identifies the present and future water system concerns, analyzes alternatives, and sets forth means for meeting those concerns. An areawide supplement consists of a water supply assessment, exclusive service area boundaries, integrated report, and executive summary.

Available Water – Per RCSA Section 25-32d-1a(4), the maximum amount of water a company can dependably supply, taking into account the following reductions applied to safe yield: any limitations imposed by hydraulics, treatment, well pump capabilities, reductions of well yield due to clogging that can be corrected with redevelopment, transmission mains, permit conditions, source construction limitations, approval limitations, or operational considerations; and the safe yield of active sources and water supplied according to contract provided that the contract is not subject to cancellation or suspension, assures the availability of water throughout a period of drought, and that the supply is reliable.

Coordinated Water System Plan – The individual water system plans of each public water system within a public water supply management area, filed pursuant to Section 25-32d of the Connecticut General Statutes, and an areawide supplement to such plans developed pursuant to Connecticut General Statute 25-33h that addresses water system concerns pertaining to the public water supply management area as a whole.

Exclusive Service Area (ESA) – An area where public water is supplied, or will be supplied, by one system. ESA boundaries comprise Part II of the areawide supplement. As part of the ESA assignment process, all existing public water systems automatically receive an ESA designation for their existing service area, be it the parcel(s) they serve or the area around their existing water mains. Public water systems and municipalities were also requested to declare for the ESA for areas currently unserved by public water systems; this is described in more detail in the Coordinated Water System Plan, Part II document published in June 2017.

Exclusive Service Area (ESA) Designation – The combination of the ESA holder and associated ESA boundaries.

Exclusive Service Area (ESA) Holder – A utility or municipality who has been assigned or recommended an ESA that includes areas not presently served by its existing system.

Executive Summary – An abbreviated overview of the coordinated water system plan for the public water supply management area that summarizes the major elements of the coordinated water system plan. The Executive Summary comprises Part IV of the areawide supplement.

Integrated Report – An overview of individual public water systems within the management area that addresses areawide water supply issues, concerns, and needs and promotes cooperation among public water systems. The report comprises Part III of the areawide supplement.

DEFINITIONS (CONTINUED)

Public Water Supply Management Area (PWSMA) – An area for coordinated water supply planning determined by the Commissioner of the Department of Public Health to have similar water supply problems and characteristics.

Public Water System (PWS) – Any private, municipal, or regional utility supplying water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serving an average of at least 25 people daily for at least 60 days per year. Types of regulated public water systems are discussed below:

Community Water System (CWS) – A public water system that regularly supplies water to at least 15 service connections or at least 25 of the same population year-round. Examples include residential subdivisions, cluster-housing projects, homeowners associations, municipalities, tax districts, apartment buildings or complexes, residential and office condominium developments, elderly housing projects, convalescent homes, and trailer or mobile home parks.

Non-Community Water System – A public water system that serves at least 25 persons at least 60 days per year and is not a Community or seasonal water system.

Non-Transient Non-Community (NTNC) Water System – A public water system that regularly supplies water to at least 25 of the same people (such as students or employees) over 6 months per year and is not a CWS. Some examples are schools, factories, office buildings, and hospitals that have their own water systems.

Transient Non-Community (TNC) Water System – Any non-community Water System that does not meet the definition of a NTNC Water System. It is a public water system that provides water in a place such as a gas station convenience store, small restaurant, or campground where people do not remain for long periods of time.

Seasonal Water System – A public water system that operates on a seasonal basis for 6 months of the year or fewer. These are typically regulated as NTNC water systems - unless sufficient service is available to meet the definition of a CWS - and often include campgrounds and shorefront communities.

Safe Yield – The maximum dependable quantity of water per unit of time that may flow or be pumped continuously from a source of supply during a critical dry period without consideration of available water limitations. The safe yield calculation for a source does not take into consideration any potential impacts to the environment.

Satellite Management – Management of a public water supply system by another public water system. Satellite management services may include operation, maintenance, administration, emergency and scheduled repairs, monitoring and reporting, billing, operator training, and the purchase of supplies and equipment.

Satellite System – A non-connected CWS of an existing system. Colloquially, a non-connected community or non-community public water system owned by a public water service provider.

DEFINITIONS (CONTINUED)

Water Supply Assessment (WSA) – An evaluation of water supply conditions and problems within the PWSMA. The evaluation is Part I of the areawide supplement.

Water Utility Coordinating Committee (WUCC) – A committee consisting of one representative from each public water system with a source of supply or service area within the PWSMA and one representative from each regional council of government within the PWSMA, elected by majority vote of the chief elected officials of the municipalities that are members of such regional council of government.

ABBREVIATIONS

ADD	Average Daily Demand
AWC	Aquarion Water Company
CAT	Capacity Assessment Tool
cfs	cubic feet per second
CGS	Connecticut General Statute(s)
CIRCA	Connecticut Institute for Resilience and Climate Adaptation
CPCN	Certificate of Public Convenience and Necessity
CT SDC	Connecticut State Data Center
CWC or CTWC	Connecticut Water Company
CWS or CWSs	Community Water System(s)
CWSP	Coordinated Water System Plan
DEEP	Department of Energy & Environmental Protection
DPH	Department of Public Health
DWQMP	Drinking Water Quality Management Plan
EPA	Environmental Protection Agency
ESA or ESAs	Exclusive Service Area(s)
FOIA	Freedom of Information Act
MCL	Maximum Contaminant Level
MDC	Metropolitan District Commission
mgd	million gallons per day
MMADD	Maximum Month Average Day Demand
MMI	Milone & MacBroom, Inc.
MOS	Margin of Safety
NDDDB	Natural Diversity Database
NTNC	Non-Transient Non-Community
OPM	Office of Policy and Management
POCD or POCDs	Plan(s) of Conservation and Development
PURA	Public Utilities Regulatory Authority
PWS	Public Water System
PWSMA	Public Water Supply Management Area
RCSA	Regulations of Connecticut State Agencies
SCCRWA	South Central Connecticut Regional Water Authority
TNC	Transient Non-Community
WPCA	Water Pollution Control Authority
WSA	Water Supply Assessment
WSP or WSPs	Water Supply Plan(s)
WUCC or WUCCs	Water Utility Coordinating Committee(s)



SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS

This document presents the Executive Summary of the coordinated public water system planning process in the Western Public Water Supply Management Area (PWSMA). The region is comprised of 64 towns within which approximately 178 community public water systems and 750 non-community public water systems currently operate. The Western Water Utility Coordinating Committee (the WUCC) convened on June 14, 2016 and has met once per month since that time up to the publication of this document. During this process, the active membership has engaged in discussions involving a variety of topics pertinent to individual public water systems and water supply in the region at large.

In conjunction with the Connecticut Department of Public Health (DPH) and its consultant team, the WUCC completed a Water Supply Assessment (final document published December 2016) and established Recommended Exclusive Service Area Boundaries (final document published June 2017, amendable as necessary). The WUCC has most recently developed a comprehensive *Final Integrated Report* and the subject *Final Executive Summary*. Each document has been formally endorsed and adopted by the WUCC following receipt and consideration of public comments. The table of contents for each of the first three components of the *Coordinated Water System Plan (CWSP)* is included as Appendix A.

Summary of Findings

During the coordinated public water system planning process, the following major findings and recommendations were derived:

Finding #1: Water planning in Connecticut is rapidly advancing through numerous stakeholder efforts. While the changes are expected to be beneficial, utilities will need to make adjustments.

The planning effort for the *State Water Plan* (January 2018) and the CWSP occurred partially concurrently, with the *State Water Plan* benefiting from data collection efforts for the *Water Supply Assessment* (December 2016) and the *Integrated Report* benefiting from the efforts put into the *State Water Plan*. In addition, DPH has commissioned a resiliency study for public water systems being performed by the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) and the University of Connecticut, which is expected to be completed later in 2018.

For utilities, participation in these efforts is only the beginning. Many utilities will need to review and make operational changes to their systems (either voluntarily or to comply with regulations) in the near future:

- Public Act 17-211 requires that a large portion of the information in individual water supply plans (WSPs) be un-redacted for public viewing. DPH is requesting that utilities provide both redacted and un-redacted copies of new WSPs that can be made available for public distribution. DPH will request redacted copies of old WSPs as necessary to meet Freedom of Information Act (FOIA) requests;

- A stricter reading of the regulations regarding the calculation of available water for public water systems by DPH has resulted in available water to meet maximum month average day demand (MMADD) for many surface water supplies and for some groundwater supplies and interconnections to be much less than previously recognized, leading to low margin of safety (MOS) being calculated for maximum months “on paper” despite water being available for use. Guidance is necessary to address how the calculation is performed, or certain large systems will need to pursue new source development that may not be necessary;
- The Drinking Water Quality Management Planning (DWQMP) process is an option for several utilities to strengthen watershed protections;
- For certain reservoir systems, compliance with the Streamflow Standards and Regulations is expected to be required in the Western PWSMA by 2030;
- For many utilities, a heightened focus on water conservation and water efficiency will be necessary to reduce future demands in order to mitigate the need for development of new sources;
- Several different committees are considering how drought planning and response are considered in Connecticut, with the potential use of reservoir forecasting models gaining traction with some larger utilities to manage drought; and
- Future capital improvement projects may be more focused on resiliency solutions than on new sources and treatment systems.

A number of interconnections are proposed to increase source resiliency in the region. The WUCC should continue efforts to encourage the parties involved to implement emergency interconnections to increase the overall resiliency of public water supply in the region.

The WUCC recognizes that most capital improvement efforts will take place at the individual utility level. WUCC meetings will continue to be a place where issues of regional significance may be discussed.

Finding #2: Regionally, sufficient water supply exists to meet existing and projected average day demands (ADD) through 2060. However, the water is not always in the location of need. Projections of ADD for the community water systems (CWSs) indicate that significant supplies will be needed for two large systems by the 20-year planning period in order to maintain margin of safety of 15 percent (1.15). Certain individual systems will require new sources even sooner to meet MMADD. Based on existing sources and procedures for calculation of available water, CWSs in the region are projecting a supply need of approximately 23.9 million gallons per day (mgd), 59.4 mgd, and 71.5 mgd respectively over the 5-year, 20-year, and 50-year planning horizons, primarily to meet MMADD.

The majority of this water need has been identified by Aquarion Water Company (AWC) for certain systems, Bethel Water Department (presently developing new supplies to replace reservoir sources), and South Norwalk Electric & Water in the five-year planning horizon (2023), with Bristol Water Department, Norwalk First Taxing District, and Wolcott Water Department potentially needing increased supply in the 20-year planning horizon (2030). These needs are based on utility projections and the current method for calculating available water for each system.

New supply sources largely needed to meet projected demands in the southern portion of the region. The WUCC encourages each individual system to make supply improvements as needed to meet projected demands. For development of new sources to meet regionally significant needs, the WUCC encourages utilities to collaborate with other parties if possible. Several of the areas which may need water are located distant from areas where potential new sources have been identified.

Based on a planning-level inventory of regionally significant supply sources (i.e., generally those capable of providing 1.0 mgd or more unless the improvement is part of a source that is currently able to regionally provide water), a total potential yield of 16.6 mgd appears available from the reactivation of the Housatonic Wellfield by AWC. Additional sources capable of providing less than 1.0 mgd will be needed to supply geographically remote systems that are in need of water. When compared to the projected deficits, the identified potential supply is not sufficient to meet projected demands. In addition, financial, environmental, and regulatory obstacles to developing new supply sources of the projected volumes are significant. The cost, time, and uncertainty of permitting new supply sources are critical issues facing the public water systems in the region.

It is recognized that a regional approach with respect to water supply source development may be necessary in the future to satisfy demands. Accordingly, the WUCC's evaluation of future supply sources has considered the ability of each potential supply to serve regionally significant needs.

Finding #3: The benefits of passive water conservation efforts envisioned by the State Water Plan would significantly reduce projected demands for many larger public water systems. At a minimum, utilities should review their existing rate structures and modify them as appropriate to encourage water conservation while covering the full cost of providing public water supply.

Top-down water conservation measures were enacted in the plumbing code and by water utilities starting in the 1980s, with many utilities believing that water savings from these efforts have been largely exhausted. However, the proliferation of water-saving devices and the general identification of the ability to reduce water consumption by customers in order to pay a smaller utility bill has resulted in declining demand in many water systems over the past decade. Future passive water conservation savings modeled based on Scenario I of the *State Water Plan* suggest that future demand reductions along this downward trend may be possible.

Based on existing sources and procedures for calculation of available water, with adjustment for passive water conservation measures, CWSs in the region are projecting a supply need of approximately 20.3 mgd, 50.7 mgd, and 55.3 mgd over the three planning horizons, primarily to meet MMADD. The passive measures are expected to result in significant reductions to the projected deficits (including eliminating projected deficits for Danbury Water Department), but not to a level sufficient to render creation of new supplies feasible to meet all projected needs.

For large utilities projecting significant deficits, re-evaluation of projected demands and development of a targeted water conservation and water efficiency program are recommended to reduce future demands and mitigate the need for development of new supply sources.

Therefore, the use of targeted water conservation and water efficiency measures and programs for many utilities (particularly AWC, who has recently developed such a program) is expected to be the primary driver to reduce the potential need for new supply sources in the future. Although it is recognized that such measures may not be necessary for all public water systems, at a minimum all

utilities are encouraged to review their existing rate structures and modify them where appropriate to encourage water conservation while covering the full cost of providing public water supply.

Finding #4: A number of methods are available to reduce future water needs, including (in order of implementation) updating projections that may be out of date, authorizing reasonable additive factors to be included in available water when calculating MOS for MMADD, implementing targeted water conservation and water efficiency measures, developing interconnections or new sources to be transferred through interconnections, and developing new sources of supply. When development of new sources of supply is necessary in the future, the Western WUCC has several utilities which can be encouraged to continue evaluating potentially regionally significant source-of-supply options.

The use of available water guidance for reservoir systems, for supplemental supply wells, and for interconnections with a maximum month flow rate higher than the annual average flow rate would be helpful for making the calculation of available water consistent with real-world applications. One example of potential guidance for reservoir systems was promulgated in the *Integrated Report* based on monthly withdrawal ratios used in the safe yield model. The exercise demonstrated that the AWC – East Derby and South Norwalk Electric and Water systems would no longer have a deficit to meet MMADD in the five-year planning horizon, and the AWC-Main, Bristol Water Department, Norwalk First Taxing District, and Wolcott Water Department systems would no longer have a deficit to meet MMADD in the 20-year planning horizon. The projected supply need for CWSs in the region including both passive water conservation measures and potential guidance for calculating available water to meet MMADD resulted in a reduction in supply need to 9.3 mgd, 15.0 mgd, and 28.1 mgd over the three planning horizons.

While the use of the above example of available water guidance would not eliminate the need for new sources entirely in the region (except for some systems), it does demonstrate how the need for new sources can be partially alleviated or could be deferred to later planning periods. This would allow utilities projecting deficits to reconsider their previous demand projections, develop targeted water conservation and water efficiency programs, and implement short-term supply measures (such as interconnections). Should the CWSP be updated on the 10-year schedule envisioned in the regulations, projected regional needs could be reevaluated prior to the 20-year planning horizon (2030) with such improvements in place.

The WUCC should coordinate with DPH on a methodology for calculation of available water and MOS to meet MMADD that is more reflective of the water actually available to provide more flexibility for the numerous caveats in supply that are unrelated to the potentially most limiting factor in the calculation.

Finding #5: The viability of small CWSs and the density of non-community systems in many areas continue to be concerns. Recent DPH efforts to identify systems with inadequate capacity have been greatly beneficial for both planning and regulatory purposes, and these efforts need to be continued.

The Capacity Assessment Tool (CAT) is being used by DPH to evaluate the technical, managerial, and financial capacity of small CWSs. The vast majority of small CWSs are considered to have overall moderate or high capacity per the CAT. General recommendations were developed for each system considered to have less than an overall high capacity, including conducting internal improvements, selling the system, or interconnecting the system. In particular, DPH has identified small community water systems managed by voluntary associations as being at high risk for having poor managerial and

financial capacity as these systems are often operated by boards or committees with high turnover and limited ability to obtain or maintain funding for capital improvements.

DPH is encouraged to continue updating the CAT for small CWSs and regularly advise ESA holders of low capacity CWSs within their ESA. DPH is encouraged to continue outreach to small CWSs with inadequate capacity, with WUCC meetings as a potential resource. Furthermore, DPH is encouraged to develop Certificate of Public Convenience and Necessity (CPCN) regulations specific to development of non-community water systems. Finally, regular education and development of a reliable funding mechanism for small CWSs are necessary in order to ensure capital improvements can be performed per the schedule for proper asset management.

Many of the smaller CWSs in the region operate with a single source of supply and no backup supply. This leaves these systems vulnerable to interrupted service due to equipment failures, contamination, and other emergencies. Even where these systems have a high CAT score, emergency interconnections would benefit these small systems. However, access to reliable funding is the most critical challenge for improving the capacity of small CWSs.

The numerous non-community systems in the region often lie adjacent to other non-community systems, thereby forming clusters. In many areas, the density of non-community water systems is quite high such that service through a consolidated system is preferred. The WUCC encourages DPH and the Water Planning Council to determine regulations and procedures to support such consolidations, and to secure funding to be distributed to support the required capital expenses for such projects. The WUCC intends to review opportunities for consolidation as new PWS are proposed.

Finding #6: The 2-year planning process has brought together a diverse group of representatives from municipal and state government, public and privately held public water systems, and regional councils of governments. This forum has enabled coordination of planning efforts and an exchange of knowledge and perspectives. Continued regular meetings by the WUCC will continue to encourage regional planning efforts.

Summary of Recommendations

Table ES-1 presents the non-capital improvement strategies developed in the *Integrated Report*. Potential capital improvement projects identified for future consideration by WUCC members include the following:

- Interconnections of small CWSs near larger utilities where interconnection is found to be the preferred option for daily supply or for emergency purposes (Section 4.3, Section 5.3);
- Address Southwest Fairfield County supply deficiencies with additional connectivity in the vicinity of the regional pipeline (Section 5.3);
- Address Northern Fairfield County supply deficiencies with two interconnections: (1) water main under Interstate 84 perpendicular to the highway; potential locations include northern Bethel (connecting the Chimney Heights System to the Brookfield System) or northern Newtown (connecting the Newtown System to the Brookfield System; and (2) water main from the Monroe portion of the Main System to the Newtown System (Section 5.3);
- Utilize interconnections to form six regionally interconnected groups of water utilities (A, B, C, D, E, and F) (Section 5.4);

TABLE ES-1: Prioritization and Implementation of Non-Capital Improvement Recommendations

Topic Area	Goal	Recommended Strategies for Western WUCC	Lead(s)	Timeframe (Priority)	
Responsible Planning	Prevent proliferation of water systems when other options are available	1. Encourage WUCC members to petition the WUCC for revision of ESA boundaries where appropriate to prevent creation of unnecessary consecutive water systems across ESA boundaries	WUCC	Ongoing	
		2. As part of the process for providing a recommendation on the development of new water systems, evaluate the proximity of other nearby water systems and the potential for consolidating the proposed water system with an existing water system	WUCC	Ongoing	
		3. Encourage DPH and the Water Planning Council to address, through regulations and/or procedures, the proliferation of multiple water systems in close proximity to one another	WUCC	Immediately	
	Work towards constructive changes to statutes and regulations		4. Explore and provide recommendations regarding appropriate modifications to the definition of available water to allow for reasonable additive factors (contract maximums, supplemental sources, demand ratios from safe yield models, etc.) to be included when calculating MOS for MMADD	WUCC, DPH	Immediately
			5. Explore and provide recommendations to streamline the Sale of Excess Water Permit process (such as a minimum threshold requirement) and eliminate the requirement in certain instances to foster regionalization	WUCC, DPH	By 2023
			6. Review the state minimum design criteria for new public water systems every 5 years to ensure the development of reliable water systems with proper technical, managerial, and financial capacity	WUCC, DPH	1st Review by 2023
			7. Support DPH's efforts to develop regulations to ensure the standardized and consistent development of new non-community water systems	DPH, WUCC	Immediately
			8. Consider development of a streamlined CPCN process for small utilities desiring a minimal degree of expansion instead of the 5-percent rule	WUCC, DPH	By 2023
			9. Review data requirements for WSPs, CWSPs, and state water planning needs (e.g., basin-level withdrawal and return flow data) and data gaps to determine if revisions to the data requirements are necessary to ensure submission of data that is useful for multiple planning purposes	WUCC, DPH, DEEP	By 2030
	Develop and use best-available data		10. Re-evaluate the timing of regional capital improvements as the results of system-specific safe yield revisions accounting for full implementation of the Streamflow Standards and Regulations become available	WUCC, Utilities	By 2023
			11. Refine projected demands as new individual WSPs are completed and incorporate into the regional projections including the refinement of the impacts of the Streamflow Regulations	WUCC, DPH	Ongoing
			12. Provide annual updates to the WUCC on the status of small systems based on the CAT	DPH, WUCC	Ongoing
			13. Keep WUCC informed regarding potentially regionally significant water supply sources	Utilities	Ongoing
			14. Revise water demand projections that may be out of date	Utilities	By 2023
			15. Encourage utilities utilizing local design standards to adopt such standards, provide them in written format to developers at the beginning of the CPCN process, and reference such standards in a development agreement	WUCC	By 2023
			16. Provide Geographic Information System data appropriate for regional planning to COGs, including ESA boundaries and general public water system service locations (such as spatial data presented in the CWSP)	DPH	Immediately, Ongoing
			17. Review and improve accuracy of spatial data regarding the locations of non-community water systems	DPH	By 2023
			18. Consider requiring all public water systems to report water usage on an annual basis	DPH, WUCC	By 2023
			19. Encourage DPH and PURA to develop a risk-based approach to be used to better evaluate the condition of systems and apply projected costs into takeover and ratemaking proceedings	WUCC	By 2030
	Improve education of small system owners		20. Require training in asset management and related recordkeeping for small water system owners	DPH	By 2023
			21. Encourage small system owners to self-evaluate their status and consider implementation of one or more options based on the recommendations in Section 4.3 and have DPH annually report on the status of such actions to the WUCC	DPH, WUCC	Ongoing
			22. Work with small water systems owned and operated by voluntary associations to determine pathways for improving technical, managerial, and financial capacity and have DPH annually report on the status of such actions to the WUCC	DPH, WUCC	Ongoing
			23. Encourage small systems to work with nonprofit organizations such as RCAP Solutions or the ASRWVA to increase managerial capacity such as for asset management and have DPH annually report on the status of such actions to the WUCC	DPH, WUCC	Ongoing
			24. Encourage ESA holders to serve as mentors to the small CWSs within their respective ESAs	WUCC, DPH	Ongoing
			25. Provide education and oversight regarding management of non-community systems	DPH	Ongoing
	Foster and support interagency planning between utilities, COGs, municipalities, and state government		26. Develop strategies to involve small CWSs and non-community water systems in the WUCC planning process	WUCC, DPH	Ongoing
			27. Encourage local municipalities to consider ESAs, future water service extension potential, desired public water service areas, and local zoning regulations in their POCDs	COGs	Ongoing
Drought Management	Consider methods to improve enforcement of water use restrictions	28. Work with agencies and committees considering drought management to evaluate the model ordinance and consider legislative authority for water utilities to enforce restrictions under certain conditions	WUCC	By 2023	
	Consider methods to improve timing of activation of drought triggers and water use restrictions	29. Work with agencies and committees considering drought management to evaluate trigger criteria, forecasting models, and other methods to coordinate drought planning and response	WUCC	By 2023	

TABLE ES-1: Prioritization and Implementation of Non-Capital Improvement Recommendations

Topic Area	Goal	Recommended Strategies for Western WUCC	Lead(s)	Timeframe (Priority)
Source Protection	Encourage prudent development and conservation of existing large, protected watersheds	30. Implement the DWQMP process (potential candidate utilities include AWC, Danbury Water Department, Norwalk First Taxing District, South Norwalk Electric & Water, Waterbury Water Department, and Winsted Water Works)	Utilities, DPH	By 2023
		31. Pursue modification of CGS 8-30g to more strongly consider source water protection concerns in reservoir watersheds and APAs	DPH	By 2023
		32. Coordinate with local planners during POCD updates to identify areas of development density that may be incompatible with reservoir watersheds and APAs and to coordinate with other watershed towns regarding source protection planning	Utilities, COGs	Ongoing
		33. Create a development review checklist for local staff, local commissions, and local health districts to assist in approval of developments in reservoir watersheds and APAs	WUCC, COGs	By 2023
	Improve stormwater quality in watersheds and aquifer recharge areas	34. Promote the adoption of best management practices for the use of green infrastructure in stormwater management design and rainwater capture for landscaping	Utilities	By 2023
		35. Improve collaboration with local plowing contractors, public works staff, and the State Department of Transportation to minimize chloride impacts to public water supply sources	Utilities	By 2023
Consider methods to improve enforcement capabilities	36. Evaluate and provide recommendations regarding methods of improving enforcement to prevent activities on private property that may lead to reservoir or aquifer contamination	WUCC	By 2023	
Water Conservation	Consider and encourage methods for water systems to utilize to enhance water efficiency	37. Explore and provide recommendations regarding various methods of reducing unaccounted-for water	WUCC	Ongoing
		38. Explore and provide recommendations regarding the use of alternative methods for tracking water usage, water loss, and waste	WUCC	Ongoing
		39. Explore and provide recommendations regarding the use of outdoor water use restrictions to be applied seasonally	WUCC	Ongoing
		40. Encourage utilities to modify rate structures to promote water conservation while covering the full cost to provide water	WUCC	Ongoing
		41. Annually identify opportunities for the purchase and joint use of water-saving equipment, such as truck-mounted flushing systems which flush mains without blowing off water to waste	WUCC	Ongoing
		42. Develop and enact targeted water conservation and water efficiency programs	Utilities, DPH	By 2023
	Consider alternative means to supply nonpotable uses	43. Encourage the use of Class B water for nonpotable uses within service area boundaries	WUCC, DPH	Ongoing
		44. Encourage the use of gray water reuse systems in new developments to reduce demands on potable water (e.g. include on local development review checklist)	WUCC, DPH	Ongoing
Consider legislation to improve water conservation	45. Explore and provide recommendations regarding state and local legislation to further regulate demand-side water conservation	WUCC, DPH	By 2030	
Encourage dissemination of water conservation information	46. Encourage local planners to include discussions in POCDs on the importance of water conservation	COGs, Utilities	Ongoing	
Resiliency	Ensure methods of calculating safe yield are consistent with climate change	47. Review safe yield regulations every 10 years to determine if data inputs (e.g., evaporation rate) and assumptions continue to be valid in light of the effects of climate change on rainfall and runoff patterns, and revise regulations if necessary	WUCC, DPH	1st Review by 2030
		48. Encourage DEEP/USGS to monitor regional groundwater levels to detect trends that may impact safe yield	WUCC	Ongoing
	Correct disparities in existing regulations	49. Update the public health code to require new wells to be elevated to the 0.2% annual chance flood elevation	DPH	By 2030
	Improve resiliency of public water systems	50. Develop redundant infrastructure, backup power, and increase system storage and conduct more comprehensive emergency response planning to improve resiliency	Utilities	Ongoing
		51. Encourage small systems with the potential to develop emergency interconnections to do so	DPH, WUCC	Ongoing
		52. Initiate planning for development of interconnections to regionally interconnect groups of systems	WUCC, Utilities	By 2030
		53. Develop procedures and secure permits to promote the regional use of supplies during short-term planned and unplanned events resulting in loss of supply (e.g., Intra-Regional Water Supply Response Plan for Southeastern Connecticut)	WUCC, Utilities	Ongoing
Develop and use best-available data	54. Assist systems in conducting asset management planning and developing formal infrastructure replacement programs	DPH	Ongoing	
	55. Re-evaluate reservoir release requirements in light of changing rainfall and runoff patterns as USGS <i>StreamStats</i> is updated	Utilities	Ongoing	
Funding	Improve availability of funding for desirable projects	56. Develop a dedicated source of grant funding to allow for the consolidation of small water systems located in close proximity	DPH	Immediately
		57. Develop a dedicated source of grant funding to allow for infrastructure projects to improve resiliency, such as allowing existing and new interconnections to operate in two directions where appropriate	DPH	Immediately
		58. Provide funding assistance for Councils of Government staff to monitor and inform local land use commissions regarding source water protection, ESA boundaries, and regional water supply challenges	DPH, OPM	Immediately
		59. Conduct regular seminars on financial management and the types of funding available for capital improvement projects	DPH	Ongoing
		60. Develop a dedicated source of grant funding for small system improvements	DPH	Immediately
		61. Develop a dedicated source of grant funding for regional water supply solutions	DPH	Ongoing
		62. Improve the accessibility of DWSRF loans for small water systems, such as through a streamlined process for certain types of improvements	DPH	Immediately
	Encourage joint use arrangements to reduce costs	63. Encourage DPH and the Water Planning Council to develop a dedicated source of funding to support periodic updates to the regional WUCC data to reflect updated safe yield calculations and individual utility projections	WUCC	Immediately
64. Encourage the use of the Intertown Capital Equipment Purchase Incentive Program (for municipal systems) as well as other arrangements (e.g. bulk purchases) to share equipment, resources, and operational staff and increase purchasing power		WUCC	Ongoing	

- Utilize interconnections to connect the adjacent regionally interconnected groups of water utilities (A, B, C, D, E, and F) with one another (Section 5.4)
- Develop interconnections between the New Fairfield municipal system and the AWC – Dunham Pond system and AWC – Birches system (Section 5.4).
- Interconnecting with or consolidating small CWS or non-community systems along or nearby the installation route of an interconnection project (Section 5.4);
- Joint development of new supply sources by multiple utilities (Section 6.1); and
- Reactivate the Housatonic River Wellfield (Section 7.5).



1.0 THE COORDINATED WATER SYSTEM PLANNING PROCESS

Connecticut's public water supply planning process was prompted by the state's extended drought in the early 1980s. During the 1985 legislative session, the Connecticut General Assembly passed Public Act 85-535, "An Act Concerning a Connecticut Plan for Public Water Supply Coordination," initiating the first statewide water supply planning program. The DPH in consultation with the Public Utilities Regulatory Authority (PURA), the Connecticut Department of Energy and Environmental Protection (DEEP), and Office of Policy and Management (OPM) was given the charge of developing a coordinated approach to long-range water supply planning to assure future supplies. The legislative finding, as reflected in Connecticut General Statutes (CGS) Section 25-33c, states the following: "In order to maximize efficient and effective development of the state's public water supply systems and to promote public health, safety, and welfare, the DPH shall administer a procedure to coordinate the planning of public water supply systems."

Pursuant to Public Act 85-535 and Section 25-33e of the Connecticut General Statutes (CGS), the boundaries of seven PWSMAs were delineated based upon the similarity of water supply issues, population density and distribution, existing sources of public water supply, service areas or franchise areas, existing interconnections between public water systems, municipal and regional planning agency boundaries, natural drainage basins, and similar topographic and geologic characteristics. The boundaries of the seven PWSMAs originally established in 1986 were consolidated in October 2014 to the three regions in existence today.

The CGS require that the Commissioner of DPH convene a WUCC for each PWSMA to implement the areawide water supply planning process. A WUCC consists of one representative from each public water system with a source of water supply or service area within the PWSMA and one representative from each regional planning agency within such area who is elected by majority vote of the chief elected officials of the municipalities that are members of such regional planning agency.

A Coordinated Water System Plan (CWSP) is comprised of the individual WSPs of the public water systems within the PWSMA that serve over 1,000 people or have 250 or more service connections, and an areawide supplement that includes a *Water Supply Assessment (WSA)*, delineation of Exclusive Service Area (ESA) boundaries, an *Integrated Report*, and an *Executive Summary*. The purpose of the CWSP is to do the following:

1. Identify the present and future water system concerns.
2. Analyze alternatives.
3. Set forth a means for meeting the identified needs.

The major components of the CWSP are described below:

Individual Water Supply Plans – Each CWS that serves more than 1,000 people or 250 service connections is required to prepare an individual WSP under Section 25-32d of the Regulations of Connecticut State Agencies (RCSA). The individual WSPs are in various stages of development and DPH approval as WSPs are generally required to be updated every 5 to 9 years. The principal goals of individual water system planning as defined by the DPH are to do the following:

1. Ensure an adequate quantity of pure drinking water now and in the future.
2. Ensure orderly growth of individual water systems.
3. Make efficient use of available resources.

Water Supply Assessment – The first of the four components of the areawide supplement. The purpose of the WSA is to evaluate existing conditions and deficiencies within the PWSMA. The Final WSA was completed and approved by the WUCC, with the final document published in December 2016.

Exclusive Service Area Boundaries –An ESA is an area where public water is supplied by one system. Numerous factors are considered in determining ESA boundaries, including existing service areas; land use plans, zoning regulations, and growth trends; physical limitations to water service; political boundaries; water company rights as established by statute, special act, or administrative decision; system hydraulics, including potential elevations or pressure zones; and ability of a water system to provide a pure and adequate supply of water now and into the future. The *Final Recommended ESA Boundaries* document was completed and approved by the WUCC in June 2017. This document will be amended as necessary by the WUCC per the procedures in its Work Plan as ESA boundary modifications occur.

Integrated Report – The *Integrated Report* is a long-term planning tool for the PWSMA. Various issues are evaluated in the *Integrated Report*, including existing and future projected populations, existing and alternative water supplies, source protection, water conservation, existing and potential interconnections, system ownership and management, satellite management/ownership issues, minimum design standards, financial considerations, potential impacts on other uses of water resources (including water quality, flood management, recreation, hydropower, and aquatic habitat issues), and land acquisition for proposed wells in stratified glaciofluvial deposits. The *Final Integrated Report* was completed and approved by the WUCC in May 2018.

Executive Summary – The *Final Executive Summary*, the subject document, provides an abbreviated overview of the CWSP for the PWSMA. It is a factual and concise summary of the major elements of the CWSP.



2.0 COMPOSITION OF THE PUBLIC WATER SUPPLY MANAGEMENT AREA

The Western PWSMA encompasses 64 towns within four councils of government (Northwest Hills, Naugatuck Valley, Metropolitan Connecticut, and Western). The boundaries of the PWSMA are generally defined by the Massachusetts state boundary to the north, the New York state boundary to the west, Long Island Sound to the south, and the Central PWSMA to the east. The towns within the Western PWSMA are listed in Table 1, with towns along the boundary called out with an asterisk as these communities may coordinate on water supply issues with local governments or utilities in the Central PWSMA.

TABLE 1
Western PWSMA Towns

Western PWSMA Towns			
Ansonia*	Derby*	New Milford	Southbury
Barkhamsted*	Easton	Newtown	Stamford
Beacon Falls*	Fairfield	Norfolk	Stratford*
Bethel	Goshen	North Canaan	Thomaston
Bethlehem	Greenwich	Norwalk	Torrington
Bridgeport	Hartland*	Oxford	Trumbull
Bridgewater	Harwinton	Plymouth	Warren
Bristol*	Kent	Prospect*	Washington
Brookfield	Litchfield	Redding	Waterbury
Burlington*	Middlebury	Ridgefield	Watertown
Canaan	Monroe	Roxbury	Weston
Cheshire*	Morris	Salisbury	Westport
Colebrook	Naugatuck	Seymour*	Wilton
Cornwall	New Canaan	Sharon	Winchester
Danbury	New Fairfield	Shelton*	Wolcott*
Darien	New Hartford*	Sherman	Woodbury

*Denotes town that is on the border with the Central PWSMA

The Western PWSMA consists of 928 public water systems as of September 20, 2017. Refer to Appended Figure 1 for a map depicting the general locations of these systems. Of these:

- 178 are regulated as Community Water Systems (CWSs).
- 193 are regulated as Non-Transient Non-Community (NTNC) water systems.
- 557 are regulated as Transient Non-Community (TNC) water systems.

The vast majority of public water systems in the region are small systems serving less than 50 people per day associated with small residential developments and small businesses. A total of 37 CWSs are considered to be “large” systems required to submit WSPs to DPH.



3.0 SUMMARY OF THE WATER SUPPLY ASSESSMENT

The Final WSA for the Western PWSMA was published in December 2016. The document presented an inventory of existing CWSs with respect to historic water quality, system reliability, service and supply adequacy, firefighting capabilities, and major facilities. A brief summary of that document is presented below.

Finished Water Quality

The quality of drinking water supplied by public water systems in Western Connecticut to customers is generally excellent. The vast majority of violations are monitoring or reporting violations rather than maximum contaminant level (MCL) violations. Additionally, most violations are one-time occurrences. There are some areas where arsenic, uranium, radon, and other constituents are of concern.

System Reliability

System reliability of large public water systems in the Western PWSMA is considered generally good. At the time of the WSA (data through 2015), most public water systems serving greater than 1,000 people have multiple sources of supply and/or emergency/backup supplies. Twenty-nine out of 37 of these systems currently have interconnections with another system. Additionally, nearly all of the large public systems serving more than 1,000 people had emergency power availability, and nearly all such systems had an average-day margin of safety that was greater than the recommended 1.15. One system had a maximum month average-day margin of safety that was less than 1.15. Three systems had a peak-day margin of safety that was less than 1.15.

DPH has recently implemented a program known as the Capacity Assessment Tool (CAT) for small CWSs that serve fewer than 1,000 people. Of the 103 small community systems in the Western PWSMA that had been evaluated at the time of the WSA, 8 percent of the systems were rated to be lacking adequate capacity, 41 percent were rated to have moderate capacity, and 51 percent were rated to have adequate capacity. The long-term goal of the CAT program is to enable DPH to target specific types of assistance to individual small CWSs.

Existing and Future Sources of Supply

Seven of the 25 systems serving more than 1,000 people maintain active reservoir supplies. Only three of these rely solely on reservoir supplies. Most of the public water served through these systems comes from groundwater supplies. Five systems that currently supply more than 1,000 people have indicated a potential need for developing additional water supplies within the 5-year planning period as reported in their individual WSPs (dates of publication vary). Nineteen systems identify a potential long-term need (i.e., within the 50-year planning period) which is considered in more detail in the *Integrated Report*. Seven reported no short-term or long-term future supply needs.

Fire Protection

All of the towns and cities in Connecticut maintain some form of fire protection for residents and businesses. Some of these municipalities rely in part on community public water systems in the area.

The majority of larger systems have adequate pressure and system components to provide some form of fire protection to customers within their supply area. Most of the smaller community systems provide little or no fire protection.

Population and Land Use

Population centers within the Western PWSMA region include Bridgeport, Bristol, Cheshire, Danbury, Fairfield, Greenwich, Naugatuck, New Milford, Newtown, Norwalk, Shelton, Stamford, Stratford, Torrington, Trumbull, Waterbury, and Westport with greater than 25,000 people. The lowest population areas within the region include Barkhamsted, Bethlehem, Bridgewater, Canaan, Colebrook, Cornwall, Goshen, Hartland, Kent, Morris, Norfolk, North Canaan, Roxbury, Salisbury, Sharon, Sherman, Warren, and Washington with fewer than 5,000 people according to the 2010 Census.

The majority of the Western PWSMA is considered suburban, with concentrations of development along the Housatonic River Valley, the Naugatuck River Valley, the Still River, and the shoreline. Growth trends in the region reflect the housing boom of the late 1990s and early 2000s, followed by the Great Recession and post-recession recovery in 2006 to 2015.

Status of Planning

Most water utilities have a WSP that has been approved in the last 5 years, and POCDs have been prepared in all member towns. Most were adopted within the last 10 years. Most community plans, such as zoning regulations and POCDs, also include pertinent information that defines allowable and anticipated uses in watershed areas. These plans often designate land uses in critical areas associated with public supply groundwater wells.

Smaller non-municipally owned community public water systems tend to have less opportunity for inclusion in broader planning objectives. Protection of these smaller systems often depends entirely on ownership of the land surrounding the source and state regulations that have established minimum allowable distances between a point source of pollution and a community groundwater supply.

Issues, Needs, and Deficiencies in the Region

Various issues, needs, and deficiencies were identified for the Western PWSMA in 2016 via data research, correspondence, and discussions with WUCC members, agency staff, and interested parties. Some of the issues that are currently facing the region include the projected need for future supply sources, the need for water supply planning coordination, the reliable quality of groundwater supplies, source protection, vulnerability of single source suppliers, viability of small community public water systems, discontinuity of service, growth trends and impacts, the impact of existing and future anticipated regulations, the need to balance raw and finished water supplies throughout the region, interconnections, and land use compatibility.



4.0 EXCLUSIVE SERVICE AREA BOUNDARIES

ESA boundaries delineate existing and potential service areas for a water system. The authority to assign franchise areas and authorizations to provide water service to water systems rests with the state legislature. Numerous water companies and utilities were granted charters or otherwise authorized by acts of the state legislature beginning in the late 18th century, resulting over time in areas where water service could be provided by more than one utility in the same area. ESA boundaries are designed to eliminate overlapping franchise and charter service areas, to prevent situations where more than one large public water system serves in the same area, and to identify responsible service providers to meet future service needs.

Establishment of boundaries for ESA holders is intended to ensure that safe and adequate drinking water is available to areas of the state where public water supply is needed. ESA designations are established based on the regulatory criteria and are based upon the agreement by a utility or municipality to serve, as necessary, previously identified unserved areas in accordance with applicable state statutes and regulations. Existing service areas (i.e., areas where service is currently being provided) were maintained and automatically received ESA designations via the delineation process. As part of this process, each public water system and municipality in the Western PWSMA was provided the opportunity to request ESA designations beyond their existing system boundaries that cover areas currently unserved by public water supply.

The Western PWSMA inherited the ESA boundary delineations established under CGS Section 25-33g for the former Housatonic WUCC, South Central WUCC, and Upper Connecticut River WUCC. These ESA boundary delineations were finalized in the late 1980s although the associated CWSPs were not approved by DPH. Several modifications were approved by the former Housatonic WUCC, South Central WUCC, and Upper Connecticut River WUCC prior to the consolidation of parts or all of the former PWSMAs into the Western PWSMA in 2014. These modifications are incorporated into this document. Future ESA modifications will be processed by the Western WUCC in accordance with the procedures specified in its Work Plan.

Being an ESA holder is a commitment to ownership and service for newly constructed public water supply needs for CWSs (essentially, residential public water supply needs), and, in general, a right of first refusal for non-community water systems (non-residential) public water supply needs. An ESA designation therefore conveys both a right and a responsibility to provide public water service pursuant to applicable state law. Section 3.0 of the *Final Recommended ESA Boundaries* document outlines the rights and responsibilities of ESA holders in more detail.

Although an ESA provider is designated, actual development and service expansion should support the direction set by municipal land use and development goals while being cognizant of the impacts that such land use and development goals have on protecting water resources, timely water service, water quality, economically priced water, and strong professional management of water supplies. Municipalities retain their ability to provide guidance for development within their borders through their local government structure and planning documents, such as municipal plans of development, ordinances, and zoning regulations. When a project is proposed at or near an ESA boundary, such boundary should be modified when such modification is determined to be the appropriate solution for providing public water service to a location.

Table 2 presents the recommended ESA providers by town. Recommended ESA boundaries are delineated in the appended mapping.

TABLE 2
Final Recommended ESA Holders in Western PWSMA

Geographic Area	ESA Holders for Unserved Areas
Ansonia	South Central Connecticut Regional Water Authority (SCCRWA).
Barkhamsted	Winsted Water Works in a small area on the west side of town along Route 44, with the remainder of town remaining unassigned.
Beacon Falls	AWC, except for Connecticut Water Company (CWC) in the northern portion of town.
Bethel	AWC in the northern portion of Bethel and Bethel Water Department in southern Bethel.
Bethlehem	AWC, except for the area between the intersection of Route 61 and Route 132 southerly up to and including the intersection of Route 61 and Jackson Lane which is claimed by the Town of Bethlehem.
Bridgeport	AWC.
Bridgewater	AWC.
Bristol	Bristol Water Department.
Brookfield	AWC.
Burlington	Bristol Water Department in the southern portion of town, CWC along portions of the eastern edge of town, and Torrington Water Company for the remainder of town.
Canaan	Town will remain unassigned.
Cheshire	SCCRWA.
Colebrook	Town will remain unassigned.
Cornwall	AWC in a small radius around its existing system; remainder of town unassigned.
Danbury	Danbury Water Department (City of Danbury).
Darien	AWC.
Derby	SCCRWA.
Easton	AWC.
Fairfield	AWC.
Goshen	Town of Goshen.
Greenwich	AWC.
Hartland	Town will remain unassigned.
Harwinton	CWC for the southern portion of town, and Torrington Water Company for the remainder of town.
Kent	AWC in a defined radius around its existing system; remainder of town unassigned.
Litchfield	AWC throughout most of central Litchfield; remainder of town unassigned.
Middlebury	CWC throughout most of Middlebury, with the exception of a small area on the western border and west of Lake Quassapaug claimed by AWC.
Monroe	AWC.
Morris	Town of Morris.
Naugatuck	CWC.
New Canaan	AWC.
New Fairfield	The existing Town of New Fairfield ESA in the downtown area inherited from the former Housatonic PWSMA will remain unchanged, and the Aquarion ESA is expanded to cover the remainder of town.
New Hartford	The existing Torrington Water Company ESA in the southwestern corner and the existing CWC ESA in the eastern part of town were inherited from the former Upper Connecticut River PWSMA. The Town of New Hartford (WPCA) in the remainder of town.

TABLE 2
Final Recommended ESA Holders in Western PWSMA

Geographic Area	ESA Holders for Unserved Areas
New Milford	AWC.
Newtown	AWC.
Norfolk	AWC.
North Canaan	AWC.
Norwalk	City of Norwalk First Taxing District Water Department in primarily the eastern and part of northwestern Norwalk, South Norwalk Electric and Water in primarily the western and part of northwestern Norwalk.
Oxford	AWC in the eastern and southeastern parts of town, CWC in the northeastern corner of town, Heritage Village Water Company throughout the western and northern parts of town.
Plymouth	CWC.
Prospect	CWC.
Redding	AWC.
Ridgefield	AWC.
Roxbury	AWC.
Salisbury	AWC in defined area around its existing system, with the remainder of town being unassigned.
Seymour	AWC throughout most of town, except for SCCRWA in south-central area of town.
Sharon	Sharon Water Department (Town of Sharon) in defined area around existing system, with remainder of town unassigned.
Shelton	AWC.
Sherman	AWC.
Southbury	Heritage Village Water Company.
Stamford	AWC.
Stratford	AWC.
Thomaston	CWC.
Torrington	Torrington Water Company.
Trumbull	AWC.
Warren	Town will be unassigned.
Washington	AWC in a small area around its existing systems, remainder of town to remain unassigned.
Waterbury	Waterbury Water Department (City of Waterbury).
Watertown	Town to remain unassigned.
Weston	AWC.
Westport	AWC.
Wilton	AWC.
Winchester	Winsted Water Works (Town of Winchester).
Wolcott	Wolcott Water Department (Town of Wolcott).
Woodbury	AWC, except for the northeastern corner (Watertown Fire District).



5.0 POPULATION AND WATER SUPPLY DEMAND

Historical population figures are shown in Table 3 and Figure 1. This data shows consistent growth throughout the region until the 1970s and 1980s. At that time, growth in the urban areas began to slow while the suburban and rural towns, for the most part, kept increasing. Urban communities began to gain population once more between 2000 and 2010.

TABLE 3
Historical Population by Town for the Western PWSMA

Town	Classification	1960	1970	1980	1990	2000	2010
Ansonia	Urban	19,819	21,160	19,039	18,403	18,554	19,249
Barkhamsted	Suburban	1,370	2,066	2,935	3,369	3,494	3,799
Beacon Falls	Suburban	2,886	3,546	3,995	5,083	5,246	6,049
Bethel	Urban	8,200	10,945	16,004	17,541	18,067	18,584
Bethlehem	Suburban	1,486	1,923	2,573	3,071	3,422	3,607
Bridgeport	Urban	156,748	156,542	142,546	141,686	139,529	144,229
Bridgewater	Suburban	898	1,277	1,563	1,654	1,824	1,727
Bristol	Urban	45,499	55,487	57,370	60,640	60,062	60,477
Brookfield	Suburban	3,405	9,688	12,872	14,113	15,664	16,452
Burlington	Suburban	2,790	4,070	5,660	7,026	8,190	9,301
Canaan	Rural	790	931	1,002	1,057	1,081	1,234
Cheshire	Suburban	13,383	19,051	21,788	25,684	28,543	29,261
Colebrook	Rural	791	1,020	1,221	1,365	1,471	1,485
Cornwall	Rural	1,051	1,177	1,288	1,414	1,434	1,420
Danbury	Urban	39,382	50,781	60,470	65,585	74,848	80,893
Darien	Urban	18,437	20,336	18,892	18,196	19,607	20,732
Derby	Urban	12,132	12,599	12,346	12,199	12,391	12,902
Easton	Suburban	3,404	4,885	5,962	6,303	7,272	7,490
Fairfield	Urban	46,183	56,487	54,489	53,418	57,340	59,404
Goshen	Rural	1,288	1,351	1,706	2,329	2,697	2,976
Greenwich	Urban	53,793	59,755	59,578	58,441	61,101	61,171
Hartland	Rural	1,416	1,303	1,416	1,866	2,012	2,114
Harwinton	Suburban	3,344	4,318	4,889	5,228	5,283	5,642
Kent	Rural	1,686	1,990	2,505	2,918	2,858	2,979
Litchfield	Suburban	6,264	7,399	7,605	8,365	8,316	8,466
Middlebury	Suburban	4,785	5,542	5,995	6,145	6,451	7,575
Monroe	Suburban	6,402	12,047	14,010	16,896	19,247	19,479
Morris	Suburban	1,190	1,609	1,899	2,039	2,301	2,388
Naugatuck	Urban	19,511	23,034	26,456	30,625	30,989	31,862
New Canaan	Suburban	13,466	17,451	17,931	17,864	19,395	19,738
New Fairfield	Suburban	3,355	6,991	11,260	12,911	13,953	13,881
New Hartford	Suburban	3,033	3,970	4,884	5,769	6,088	6,970
New Milford	Suburban	8,318	14,601	19,420	23,629	27,121	28,142
Newtown	Suburban	11,373	16,942	19,107	20,779	25,031	27,560
Norfolk	Rural	1,827	2,073	2,156	2,060	1,660	1,709
North Canaan	Suburban	2,836	3,045	3,185	3,284	3,350	3,315
Norwalk	Urban	67,775	79,288	77,767	78,331	82,951	85,603

TABLE 3
Historical Population by Town for the Western PWSMA

Town	Classification	1960	1970	1980	1990	2000	2010
Oxford	Suburban	3,292	4,480	6,634	8,685	9,821	12,683
Plymouth	Suburban	8,981	10,321	10,732	11,822	11,634	12,243
Prospect	Suburban	4,367	6,543	6,807	7,775	8,707	9,405
Redding	Suburban	3,359	5,590	7,272	7,927	8,270	9,158
Ridgefield	Suburban	8,165	18,188	20,120	20,919	23,643	24,638
Roxbury	Rural	912	1,238	1,468	1,825	2,136	2,262
Salisbury	Rural	3,309	3,573	3,896	4,090	3,977	3,741
Seymour	Urban	10,100	12,776	13,434	14,288	15,454	16,540
Sharon	Rural	2,141	2,491	2,623	2,928	2,968	2,782
Shelton	Urban	18,190	27,165	31,314	35,418	38,101	39,559
Sherman	Suburban	825	1,459	2,281	2,809	3,827	3,581
Southbury	Suburban	5,186	7,852	14,156	15,818	18,567	19,904
Stamford	Urban	92,713	108,798	102,453	108,056	117,083	122,643
Stratford	Urban	45,012	49,775	50,541	49,389	49,976	51,384
Thomaston	Suburban	5,850	6,233	6,276	6,947	7,503	7,887
Torrington	Suburban	30,045	31,952	30,987	33,687	35,202	36,383
Trumbull	Urban	20,379	31,394	32,989	32,016	34,243	36,018
Warren	Rural	600	827	1,027	1,226	1,254	1,461
Washington	Rural	2,603	3,121	3,657	3,905	3,596	3,578
Waterbury	Urban	107,130	108,033	103,266	108,961	107,271	110,366
Watertown	Suburban	14,837	18,610	13,489	20,453	21,661	22,514
Weston	Suburban	4,039	7,417	8,284	8,648	10,037	10,179
Westport	Urban	20,955	27,318	25,290	24,410	25,749	26,391
Wilton	Suburban	8,026	13,572	15,351	15,989	17,633	18,062
Winchester	Suburban	10,496	11,106	10,841	11,524	10,664	11,242
Wolcott	Suburban	8,889	12,495	13,008	13,700	15,215	16,680
Woodbury	Suburban	3,910	5,869	6,942	8,131	9,198	9,975

Source: U.S. Census Bureau 1960 through 2010

**Figure 1: Population Growth by Municipality Classification:
Western PWSMA**

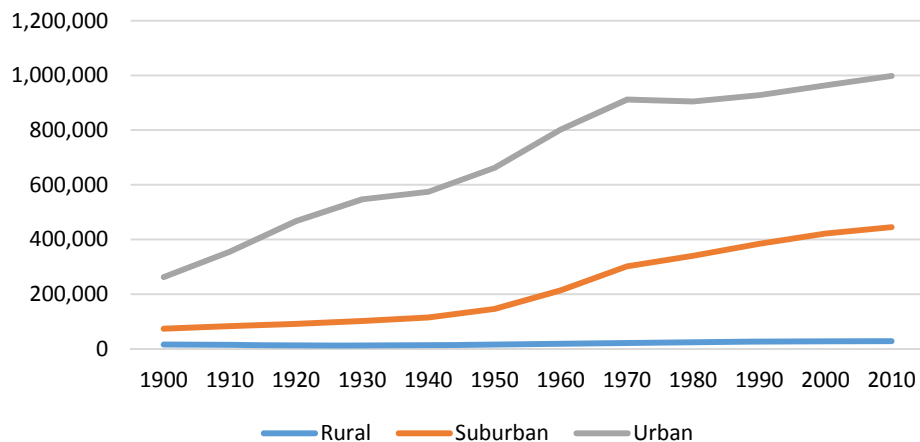


Table 4 presents future projections by town for the Western PWSMA. This data has been published by the Connecticut State Data Center (CT SDC) and interpolated where necessary (process described in the *Integrated Report*) to meet the required planning horizons. Note that actual population growth and decline over these planning periods may be more diffuse in some areas and more concentrated in other areas than presented in this report.

TABLE 4
Population Projections by Town for the Western PWSMA

Town	Classification	2010 Pop.	CT SDC 2015 Pop.	2023 Pop. Proj.	CT SDC 2030 Pop. Proj.	CT SDC 2040 Pop. Proj.	2060 Pop. Proj.
Ansonia	Urban	19,249	19,481	20,083	20,648	21,067	21,461
Barkhamsted	Suburban	3,799	3,847	3,704	3,530	3,148	3,148
Beacon Falls	Suburban	6,049	6,266	6,471	6,587	6,587	6,587
Bethel	Urban	18,584	18,176	17,248	16,376	15,007	15,007
Bethlehem	Suburban	3,607	3,606	3,590	3,577	3,346	3,346
Bridgeport	Urban	144,229	145,842	150,329	154,065	154,658	154,658
Bridgewater	Suburban	1,727	1,661	1,418	1,211	937	937
Bristol	Urban	60,477	59,919	59,374	59,002	57,129	57,129
Brookfield	Suburban	16,452	16,225	15,529	14,942	14,513	14,513
Burlington	Suburban	9,301	9,524	9,394	8,991	8,699	8,699
Canaan	Rural	1,234	1,254	1,406	1,578	1,488	1,488
Cheshire	Suburban	29,261	28,890	27,619	26,127	24,860	24,860
Colebrook	Rural	1,485	1,439	1,345	1,251	1,100	1,100
Cornwall	Rural	1,420	1,355	1,212	1,082	901	901
Danbury	Urban	80,893	82,757	86,363	89,801	94,602	105,526
Darien	Urban	20,732	21,026	19,896	19,286	22,250	26,700
Derby	Urban	12,902	13,032	13,417	13,803	14,082	14,451
Easton	Suburban	7,490	7,115	6,523	6,015	5,388	5,388
Fairfield	Urban	59,404	59,311	58,736	59,188	67,101	80,521
Goshen	Rural	2,976	3,048	3,103	3,127	3,089	3,089
Greenwich	Urban	61,171	59,681	55,556	52,160	47,132	47,132
Hartland	Rural	2,114	2,081	1,978	1,849	1,581	1,581
Harwinton	Suburban	5,642	5,621	5,449	5,273	4,799	4,799
Kent	Rural	2,979	2,935	2,767	2,591	2,267	2,267
Litchfield	Suburban	8,466	8,403	8,110	7,905	7,238	7,238
Middlebury	Suburban	7,575	7,948	8,318	8,522	8,828	8,828
Monroe	Suburban	19,479	18,521	16,152	14,002	11,961	11,961
Morris	Suburban	2,388	2,368	2,332	2,310	2,202	2,202
Naugatuck	Urban	31,862	31,973	32,339	32,638	31,854	31,854
New Canaan	Suburban	19,738	19,744	18,152	17,189	18,563	22,276
New Fairfield	Suburban	13,881	13,060	11,033	9,191	7,324	7,324
New Hartford	Suburban	6,970	7,170	7,262	7,256	7,047	7,047
New Milford	Suburban	28,142	27,594	26,133	24,760	22,723	22,723
Newtown	Suburban	27,560	28,075	27,498	26,825	28,220	33,864
Norfolk	Rural	1,709	1,681	1,592	1,506	1,348	1,506
North Canaan	Suburban	3,315	3,214	3,098	2,993	2,794	2,794
Norwalk	Urban	85,603	85,927	86,888	88,249	90,247	97,110

TABLE 4
Population Projections by Town for the Western PWSMA

Town	Classification	2010 Pop.	CT SDC 2015 Pop.	2023 Pop. Proj.	CT SDC 2030 Pop. Proj.	CT SDC 2040 Pop. Proj.	2060 Pop. Proj.
Oxford	Suburban	12,683	13,842	15,353	16,355	17,856	19,270
Plymouth	Suburban	12,243	12,250	12,149	11,986	11,384	11,384
Prospect	Suburban	9,405	9,366	9,063	8,692	8,216	8,216
Redding	Suburban	9,158	9,263	9,113	9,065	9,007	9,007
Ridgefield	Suburban	24,638	24,541	22,608	21,304	22,187	26,624
Roxbury	Rural	2,262	2,290	2,227	2,176	2,039	2,039
Salisbury	Rural	3,741	3,617	3,240	2,945	2,405	2,405
Seymour	Urban	16,540	16,675	16,836	16,924	16,753	16,753
Sharon	Rural	2,782	2,612	2,264	1,963	1,520	1,520
Shelton	Urban	39,559	39,102	37,832	36,567	34,543	34,543
Sherman	Suburban	3,581	3,279	2,794	2,349	1,803	1,803
Southbury	Suburban	19,904	19,661	19,244	18,986	18,758	18,758
Stamford	Urban	122,643	123,941	127,213	129,813	128,825	128,825
Stratford	Urban	51,384	51,530	52,478	53,816	55,394	60,709
Thomaston	Suburban	7,887	7,884	7,796	7,694	7,370	7,370
Torrington	Suburban	36,383	36,478	37,020	37,562	37,315	37,315
Trumbull	Urban	36,018	35,984	34,871	33,667	33,154	33,154
Warren	Rural	1,461	1,564	1,583	1,586	1,520	1,520
Washington	Rural	3,578	3,508	3,227	2,955	2,462	2,462
Waterbury	Urban	110,366	111,084	113,933	117,111	119,211	122,998
Watertown	Suburban	22,514	22,344	21,774	21,220	19,871	19,871
Weston	Suburban	10,179	9,659	8,330	7,697	7,007	7,007
Westport	Urban	26,391	26,194	23,639	21,598	21,688	26,026
Wilton	Suburban	18,062	17,723	15,809	14,390	14,642	17,570
Winchester	Suburban	11,242	11,304	11,350	11,325	10,938	10,938
Wolcott	Suburban	16,680	16,909	16,879	16,773	16,510	16,510
Woodbury	Suburban	9,975	10,001	9,735	9,502	9,052	9,052
Totals	All	1,471,124	1,472,375	1,459,777	1,451,427	1,447,510	1,515,665
	Rural	27,741	27,384	25,945	24,609	21,720	21,878
	Suburban	445,376	443,356	426,801	412,106	401,093	419,229
	Urban	998,007	1,001,635	1,007,031	1,014,712	1,024,697	1,074,558

Source: U.S. Census Bureau 2010; Population Projections published in 2017 by CT SDC

Service population and public water supply ADD projections for the region were generated based on information supplied by representatives of the public water systems. Demands were analyzed for existing conditions as well as the 5-, 20-, and 50-year planning periods in the *Integrated Report*. Table 5 summarizes the projections by each ESA holder in the PWSMA. The supplies and demands considered in Table 5 include small satellite systems within the outer ESA boundary of each ESA holder which are not owned and operated by each ESA holder. For example, the AWC system in Derby is included within the data for the SCCRWA ESA.

The regional margin of safety for ADD is above 1.15 for all planning horizons. However, available supply is not always in the location of need. Several systems are projecting deficits of supply within their ESAs in each planning period. Fortunately, each system in need is interconnected with other utilities, allowing for collaboration regarding supply development to occur and water to potentially be transferred through the regional system to those systems in need.

Table 6 presents the regional deficits to meet MMADD. Three demand scenarios were evaluated in the *Integrated Report*: The projections performed by water utilities for their systems, those projections with passive water conservation applied based on Scenario I in the *State Water Plan*, and the above with available water increased based on potential guidance for meeting MMADD. The majority of new water need has been identified in the AWC – Main and AWC – Southwest Fairfield County systems, and the implementation of targeted water conservation and water efficiency measures (which are in development by AWC) is expected to be the primary method of meeting future deficits for these systems following reactivation of the Housatonic River Wellfield in Shelton.

The projected deficits indicate that new supplies may need to be developed within the various planning horizons, even after accounting for the passive benefits of water conservation and potential available water guidance to reduce “on paper” deficits. As discussed in the *Integrated Report*, mitigating available water deficits is relatively straightforward for some systems, particularly those with minimal deficits. However, the benefits of reducing demand to mitigate the need for additional supply are shown by the limited passive water conservation exercise provided in the *Integrated Report*. Therefore, systems projecting deficits are recommended to reevaluate their demand projections and consider development of a targeted water conservation and water efficiency program to reduce unnecessary water usage on both the supply side and demand side of the system.

Table 6: Summary of Available Water Deficits to Meet MMADD for Community Water Systems (mgd)

Community Water System	Scenario A: Utility Projections			Scenario B: Utility Projections with Passive Water Conservation			Scenario C: Utility Projections with Passive Water Conservation and Available		
	Total New Sources Needed to Meet MOS 1.15 in 2023	Total New Sources Needed to Meet MOS 1.15 in 2030	Total New Sources Needed to Meet MOS 1.15 in 2060	Total New Sources Needed to Meet MOS 1.15 in 2023	Total New Sources Needed to Meet MOS 1.15 in 2030	Total New Sources Needed to Meet MOS 1.15 in 2060	Total New Sources Needed to Meet MOS 1.15 in 2023	Total New Sources Needed to Meet MOS 1.15 in 2030	Total New Sources Needed to Meet MOS 1.15 in 2060
Aquarion Water Company - Barnum	0.017	0.017	0.017	0.017	0.016	0.015	-	-	-
Aquarion Water Company - Brookfield	-	0.447	0.484	-	0.392	0.390	-	0.392	0.390
Aquarion Water Company - Chimney Heights	0.140	0.209	0.215	0.132	0.186	0.184	0.132	0.186	0.184
Aquarion Water Company - East Derby	0.050	0.050	0.050	0.047	0.040	0.033	-	-	-
Aquarion Water Company - Hollandale Estates	0.013	0.013	0.013	0.013	0.013	0.013	-	-	-
Aquarion Water Company - Ken Oaks	0.012	0.012	0.012	0.012	0.012	0.012	-	-	-
Aquarion Water Company - Main	-	27.226	33.023	-	23.712	26.825	-	-	12.184
Aquarion Water Company - McKeon	0.010	0.010	0.010	0.010	0.010	0.009	-	-	-
Aquarion Water Company - Newtown	0.201	1.069	1.308	0.201	1.069	1.308	0.201	1.069	1.308
Aquarion Water Company - Ridgefield	-	-	-	-	-	-	-	-	-
Aquarion Water Company - Rolling Ridge	0.008	0.008	0.008	0.008	0.008	0.008	-	-	-
Aquarion Water Company - Southwest Fairfield County Region (Greenwich, Stamford, Noroton, and New Canaan Systems)	21.105	25.841	28.049	18.228	21.502	21.958	8.876	13.273	13.729
Arrowhead Point Homeowners Association	0.004	0.004	0.004	0.003	-	-	0.003	-	-
Bethel Water Department	-	-	-	-	-	-	-	-	-
Bristol Water Department	-	1.026	2.302	-	1.000	1.388	-	-	-
Canaan Water Department	0.016	0.016	0.016	0.015	0.014	0.014	0.015	0.014	0.014
Candlewood Park, Inc.	0.011	0.011	0.011	0.009	0.006	-	-	-	-
Danbury Water Department	-	-	1.391	-	-	-	-	-	-
Farmington Line West Condominiums	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.002	0.002
Lillionah Park Estates Homeowners Association	0.010	0.010	0.010	0.009	0.008	0.006	0.009	0.008	0.006
Norwalk First Taxing District	-	1.807	2.336	-	1.409	1.580	-	-	-
Pine Grove Association, Inc.	0.019	0.019	0.019	0.018	0.017	0.015	0.018	0.017	0.015
Rumsey Hall School	0.017	0.017	0.017	0.016	0.013	0.011	0.016	0.013	0.011
South Norwalk Electric & Water	1.699	1.515	1.941	1.574	1.146	1.286	-	-	-
Wolcott Water Department	-	0.097	0.301	-	0.075	0.254	-	-	0.254
TOTAL	23.336	59.426	71.538	20.316	50.651	55.310	9.274	14.974	28.097

Total available water need accounts for reduction in available water due to streamflow releases.

AWC-Barnum, AWC-Hollandale Estates, AWC-Ken Oaks, AWC-McKeon, AWC-Rolling Ridge, and Candlewood Park deficits met through interconnection: AWC-Ridgefield projected demands able to be met through registered (up to 1.3 mgd) transfers from AWC-Main.

AWC-Southwest Fairfield County Region projected demands able to be partially met through registered (up to 7.26 mgd) transfers from AWC-Main.

Bethel Water Department assumed to develop groundwater sources in the near future sufficient to offset existing available water from reservoirs.



6.0 POTENTIAL INTERCONNECTIONS, JOINT USE FACILITIES, AND SATELLITE MANAGEMENT

In the Western PWSMA, several public water systems receive all of their water supply from an interconnection with another system. Those consecutive systems that receive water from a neighboring system include the following:

- From Countryside Apartments: AWC-Clearview;
- From Danbury Water Department: AWC-Barnum, AWC-Berkshire, AWC-Hollandale Estates, AWC-Ken Oaks, AWC-McKeon, and AWC-Rolling Ridge;
- From Heritage Village Water Company: AWC-Oxford Town Center;
- From SCCRWA AWC-East Derby and AWC-Hawkstone;
- From Waterbury Water Department: CWC-Hillcrest, Watertown Water & Sewer, and Wolcott Water Department; and
- From Watertown Fire District: Watertown Water & Sewer – Westgate.

In particular, the AWC-Southwest Fairfield County systems in southwestern Connecticut are interconnected and managed to balance supply and demand in a regionally efficient manner. Additional interconnections also exist throughout the region either to provide supplemental supply on an intermittent basis (such as from Waterbury Water Department to CWC-Thomaston) or for emergency purposes.

While it is recognized that the majority of projected deficits in the region are within interconnected systems, existing supplies within the regionally interconnected system are limited. Collaboration between utilities to develop new supply sources near its system may be necessary to increase available water supply, with a portion of the new supply allocated between the collaborating utilities and delivered through interconnections.

The regulatory and participatory process involved in creating regional interconnections can be costly and time-consuming. It also requires the cooperation of many municipal and private entities for its success. There are currently no mandates for systems to interconnect or for systems to act as a vehicle for pass-through transmission of water. A lack of cooperation on the part of one or more entities could necessitate the installation of parallel transmission piping. Thus, each system projecting a deficit will continue to need to consider potential new sources of supply other than interconnections to address projected deficits.

Many of the smaller community public water systems in the region (and some of the larger systems) operate with a single source of supply (or wellfield), with no backup supply (or wellfield). This leaves these systems vulnerable to interrupted service due to equipment failures, contamination, and the like. Development of interconnections has been proposed for several of these systems in the *Integrated Report*.

The joint use or ownership of facilities for public water systems in the western Connecticut is not well documented. Based on local system knowledge, joint use or ownership of major infrastructure such as supply sources, storage, treatment, or water mains is not currently practiced in the region. The sharing

of water is more common than the sharing of infrastructure, which WUCC members generally feel should be assigned to one entity. Development of additional regional interconnections to increase resiliency is recommended, and the development of *Intraregional Water Supply Response Plans* to manage transfers of water between utilities may be of interest to streamline response and activation procedures, as well as to potentially authorize limited nonemergency use of the regionally interconnected system(s) for planned maintenance events.

Given the forecast water supply deficit in the western region, there may be a potential for future shared ownership and use of supplies beyond routine interconnections. This type of shared use would require formal agreements among the stakeholders. Large-scale regional interconnections of future water supplies could be fed by a jointly owned supply source although none have been identified to date. This may become more common if water supply development trends towards regional supplies to meet the needs of several systems.

Satellite management can be a cost-effective means of operating a small system because it takes advantage of the "economy of scale" factor that larger water suppliers can offer. This is presented as a potential option in the *Integrated Report* for many of the small CWSs in the region. Furthermore, "outside-the-box" ideas such as the relationship between AWC-Clearview and Countryside Apartments in Wolcott to share operational costs for the source system should continue to be pursued in the future to meet difficult supply challenges. Table 7 presents a summary of satellite management needs and opportunities of major providers in the region.

TABLE 7
Satellite Management Needs and Opportunities of ESA Providers

ESA Holder	Intend to Operate Their Own Satellite Public Water Systems	Potential Need for Contract Operation by Other Providers	Available to Operate Satellite Water Systems for Others	Satellite Systems Unlikely to Occur in ESA
Aquarion Water Company	X		X	
Bethel Water Department				X
Bristol Water Department				X
Connecticut Water Company	X		X	
Danbury Water Department	X			
ESA Unassigned		X		
Heritage Village Water Company	X		X	
New Fairfield WPCA		X		X
New Hartford WPCA		X^		X
Norwalk First Taxing District				X
South Central CT Regional Water Authority	X*			
Sharon Water Department				X
South Norwalk Electric & Water				X
State Agency Existing Service Area				X
Torrington Water Company	X		X	
Town of Bethlehem		X		
Town of Goshen		X		
Town of Morris		X		

TABLE 7
Satellite Management Needs and Opportunities of ESA Providers

ESA Holder	Intend to Operate Their Own Satellite Public Water Systems	Potential Need for Contract Operation by Other Providers	Available to Operate Satellite Water Systems for Others	Satellite Systems Unlikely to Occur in ESA
Waterbury Water Department				X
Watertown Fire District				X
Watertown Water & Sewer Authority				X
Winsted Water Works	X			
Wolcott Water Department	X			

*Water main extensions preferred over satellite system operation for these utilities.

^Currently has a contract operator for its systems.



7.0 POTENTIAL WATER SUPPLY SOURCES

A review of individual WSPs was conducted to determine the potential sources of supply being considered by utilities in the region to increase available water in their systems. Most utilities identified one or more options for new supply sources, including potential interconnections, modifications to existing surface water supplies, reactivation of groundwater supplies, reactivation of surface water supplies, development of new surface water diversions, and development of new groundwater wells.

Creation of new supply sources carries a high capital cost and high investment in planning, agreements, permitting, and conceptual design, with successful permitting of a proposed source not guaranteed. As such, the *Integrated Report* recommends the following prioritization of actions regarding new source development:

- For systems demonstrating projected deficits, reevaluate potential demands (particularly for older WSPs);
- Develop a targeted water conservation and efficiency program to further reduce residential, nonresidential, irrigation, unaccounted-for water, and other unnecessary water usage;
- Develop active and/or emergency interconnections between small CWSs in the region; and
- Consolidate resources to develop new supply sources and utilize existing interconnections to transfer new water supplies developed in one area of the regionally interconnected water system to other areas in need.

For the purposes of the CWSP, regionally significant supply sources were identified as new sources or activities with the potential to increase available water by 1.0 mgd or more which are proximal to the system in need, and any infrastructure improvements to enhance safe yield associated with sources which already serve regional needs. Furthermore, regionally significant supplies needed to have been advanced beyond the conceptual level in order to be considered regionally significant. For example, a proposal for the development of a new supply source was only considered regionally significant if preliminary testing was performed to estimate potential yield.

Potentially regionally significant actions to increase available supply in the region at this time include reactivation of the Housatonic River wellfield in Shelton by AWC, which is expected to increase available water in the AWC-Main system by 16.6 mgd. Other projected deficits are expected to be able to be met through the use of guidance to address available water for MMADD and through development of programs to implement targeted water conservation and water efficiency measures.

Utilities are encouraged to continue development of supply sources which may not be regionally significant as further evaluation may reveal that such actions could be applicable at a regional scale. Prioritization of potential projects by cost and potential yield will need to be pursued by the WUCC over the next 5 to 10 years as more information comes available.



8.0 POTENTIAL IMPACTS OF THE COORDINATED WATER SYSTEM PLAN ON OTHER USES OF WATER RESOURCES

The discussion in the *Integrated Report* evaluates the potentially regionally significant sources of supply from a “1,000-foot” view to provide some conceptual details regarding the potential impacts of use of these sources on other uses of water resources. Development of future supply sources can potentially have impacts on water quality, minimum streamflows, flood management, recreation, hydropower, listed species and aquatic habitat, riparian rights, and waste load allocations. Each of these issues will require careful evaluation prior to the development of any new supply source. These issues are typically evaluated as part of diversion permit applications for proposed sources of supply although it is recognized that reactivation of registered supply sources would likely not require a diversion permit.

The sole regionally-significant project identified in the Western PWSMA at this time to increase available water in the region is the reactivation of the Housatonic River Wellfield. Other projects proposed (such as emergency interconnections) will increase system resiliency but have a minimal impact on other uses of water resources. A summary of the evaluation for the Housatonic River Wellfield is provided below:

- **Water Quality:** The Housatonic River Wellfield lies in an area where the groundwater quality is mapped as Class GA, and public water supply withdrawals are consistent with this classification. In addition, as the withdrawal is 13% of the 99% duration flow in the river, water quality in the river may be minimally affected during periods of low flow as treated wastewater comprises a slightly higher percentage of flow.
- **Minimum Streamflow:** As noted above, the withdrawal is 13% of the 99% duration flow in the river, such that more than 170 cubic feet per second (cfs) should continue to flow in the river during low-flow conditions.
- **Flood Management:** Because the Housatonic River Wellfield already exists, it is likely that minimal additional construction will be needed to reactivate the wells. Activities that are necessary should proceed in a manner consistent with the City of Shelton Code or Ordinances.
- **Recreation:** The Housatonic River Wellfield already coexists with nearby and surrounding recreational lands and uses. Many of the higher quality recreational uses (fishing, boating) occur upstream of the wellfield in Litchfield County. Reactivation of the wellfield will have only minimal impacts to the Housatonic River’s discharge and stage for the reasons provided above. Therefore, instream recreation such as fishing and boating will not be impacted, although it must be noted that fishing is limited for the reasons cited in the 2016 Connecticut Integrated Water Quality Report.
- **Hydropower:** The Housatonic River is heavily relied upon for hydropower, with dams located upstream and downstream of the wellfield. Reactivation of the wellfield will have only minimal impacts to the Housatonic River’s discharge and stage for the reasons provided above. The flow diminution of 27.9 cfs is a negligible fraction of the discharges needed to maintain the heads required for hydropower generation. Therefore, hydropower will not be impacted.

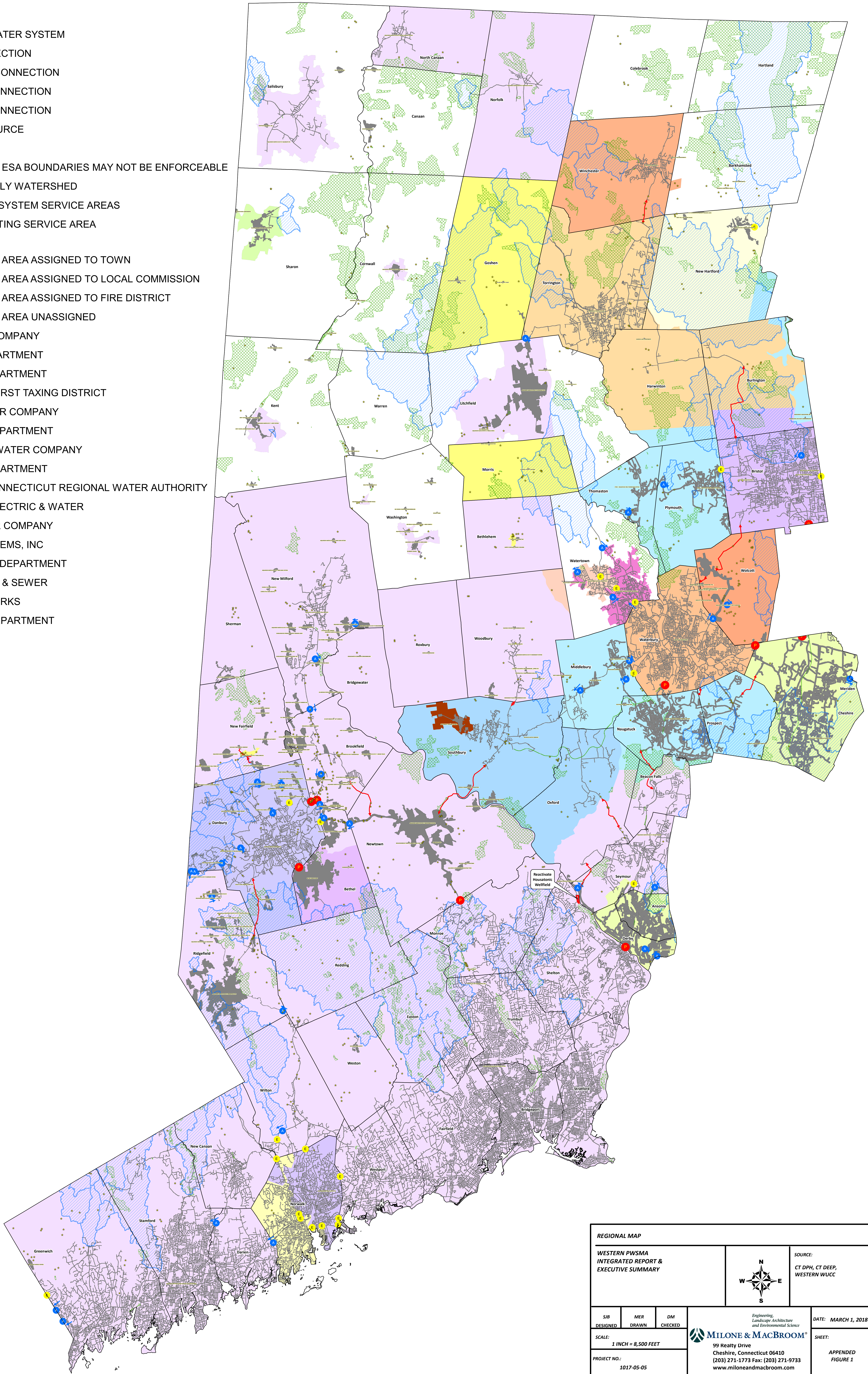
- Natural Diversity Database (NDDB): The Housatonic River is lined by an elongated NDDB area which likely represents species dependent on instream flow and river state. Reactivation of the wellfield will have only minimal impacts to the Housatonic River's discharge and stage for the reasons provided above. Therefore, threatened and endangered species will not be impacted.
- Aquatic Habitat Concerns: The occurrence of aquatic habitat impacts would be directly related to proposed withdrawal rates. The section of the Housatonic River near the wellfield is considered "fully supporting" for aquatic life but "not supporting" for recreation and fish consumption in the 2016 Connecticut Integrated Water Quality Report. The likely cause of impairment appears to be E. Coli bacteria. The DEEP has issued a fish consumption advisory as a result of the bioaccumulation of polychlorinated biphenyls (PCBs). Given the nature and sources of the impairments – bacteria and PCBs – the flow diminution associated with the wellfield will not further impair water quality.
- Riparian Rights: The largest non-consumptive water user in the Housatonic River watershed appears to be First Light based on diversion registrations and permits. Consumptive uses are largely public water supply (and in many cases, those uses are owned by AWC). Given the 25.7 cfs withdrawal associated with the 16.6 mgd yield of the wellfield, impact to riparian rights will be minimal.
- Waste Load Allocation: There are sewage treatment plants discharging to the Housatonic River and its tributaries, hence its Class B water quality designation. In theory, diminution of instream flow during low flow periods could impact water quality by making treated wastewater a relatively higher percentage of instream flow in some areas. However, given the low percentage of the 27.9 cfs withdrawal relative to the 99% duration flow of the river, waste load allocation should not be impaired.
- Climate Change and Resilience: The Housatonic River Wellfield is relatively resilient to the effects of climate change and droughts because the watershed size above the wellfield is very large. The size of the drainage basin and the many contributing tributaries combined with the flow regulation associated with the First Light impoundments will tend to mitigate for flashy droughts that may occur more frequently in the future. Compared to new water supplies in small watersheds, the Housatonic Wellfield is ideally situated for drought resilience.

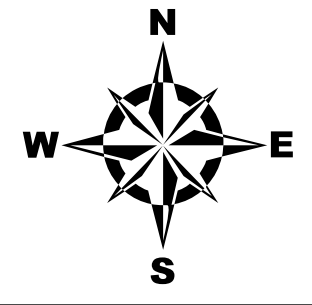



APPENDED FIGURE

Legend

- NON-COMMUNITY WATER SYSTEM
- ACTIVE INTERCONNECTION
- EMERGENCY INTERCONNECTION
- PROPOSED INTERCONNECTION
- PROPOSED INTERCONNECTION
- ▭ PROPOSED NEW SOURCE
- ▭ TOWN BOUNDARIES
- ▨ DEEP LANDS WHERE ESA BOUNDARIES MAY NOT BE ENFORCEABLE
- ▨ PUBLIC WATER SUPPLY WATERSHED
- ▨ COMMUNITY WATER SYSTEM SERVICE AREAS
- ▨ STATE AGENCY EXISTING SERVICE AREA
- Exclusive Service Area**
- ▨ EXCLUSIVE SERVICE AREA ASSIGNED TO TOWN
- ▨ EXCLUSIVE SERVICE AREA ASSIGNED TO LOCAL COMMISSION
- ▨ EXCLUSIVE SERVICE AREA ASSIGNED TO FIRE DISTRICT
- ▨ EXCLUSIVE SERVICE AREA UNASSIGNED
- ▨ AQUARION WATER COMPANY
- ▨ BETHEL WATER DEPARTMENT
- ▨ BRISTOL WATER DEPARTMENT
- ▨ CITY OF NORWALK FIRST TAXING DISTRICT
- ▨ CONNECTICUT WATER COMPANY
- ▨ DANBURY WATER DEPARTMENT
- ▨ HERITAGE VILLAGE WATER COMPANY
- ▨ SHARON WATER DEPARTMENT
- ▨ SOUTH CENTRAL CONNECTICUT REGIONAL WATER AUTHORITY
- ▨ SOUTH NORWALK ELECTRIC & WATER
- ▨ TORRINGTON WATER COMPANY
- ▨ VALLEY WATER SYSTEMS, INC
- ▨ WATERBURY WATER DEPARTMENT
- ▨ WATERTOWN WATER & SEWER
- ▨ WINSTED WATER WORKS
- ▨ WOLCOTT WATER DEPARTMENT



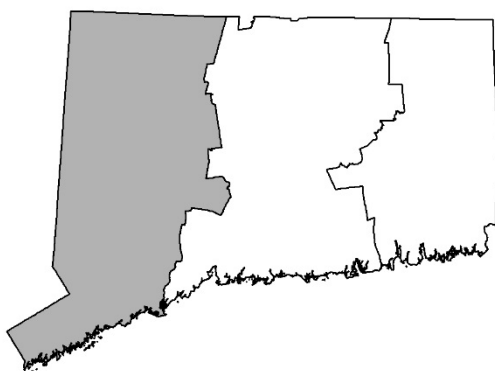
REGIONAL MAP		WESTERN PWPSMA INTEGRATED REPORT & EXECUTIVE SUMMARY		 <small>SOURCE: CT DPH, CT DEEP, WESTERN WUCC</small>
<small>SUB DESIGNED</small>	<small>MER DRAWN</small>	<small>DM CHECKED</small>	<small>DATE: MARCH 1, 2018</small>  <small>SHEET:</small>	
<small>SCALE: 1 INCH = 8,500 FEET</small>			<small>99 Realty Drive Cheshire, Connecticut 06410 (203) 271-1773 Fax: (203) 271-9733 www.miloneandmacbroom.com</small>	
<small>PROJECT NO.: 1017-05-05</small>			<small>APPENDED FIGURE 1</small>	



APPENDIX A

TABLE OF CONTENTS FOR PART I, PART II, AND PART III OF COORDINATED WATER SYSTEM PLAN

Coordinated Water System Plan
Part I: Final Water Supply Assessment
Western Connecticut Public Water Supply Management Area
December 12, 2016



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TABLE OF CONTENTS

	<u>Page</u>
Notice to Readers	i
Acknowledgements	ii
Table of Contents.....	iv
Definitions.....	ix
Abbreviations.....	xii
EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION.....	1-1
1.1 The Coordinated Water System Planning Process.....	1-1
1.2 Components of the Coordinated Water System Plan.....	1-5
1.3 Western Connecticut Public Water Supply Management Area.....	1-6
1.4 Western Connecticut Water Utility Coordinating Committee.....	1-9
1.5 Information Sources.....	1-10
2.0 EXISTING PUBLIC WATER SYSTEMS.....	2-1
2.1 Composition of the Region	2-1
2.2 Assessment of Water Quality and Source Protection Concerns.....	2-10
2.3 Assessment of System Reliability.....	2-18
2.4 Assessment of Service and Supply Adequacy	2-20
2.5 Assessment of Firefighting Capabilities	2-23
2.6 Assessment of Major Facilities.....	2-26
3.0 ASSESSMENT OF FUTURE WATER SUPPLY SOURCES.....	3-1
3.1 Aquarion Water Company	3-2
3.2 Bethel Water Department	3-3
3.3 Bristol Water Department	3-3
3.4 Candlewood Shores Tax District	3-3
3.5 Connecticut Water Company.....	3-3
3.6 Danbury Water Department	3-4
3.7 First Taxing District of the City of Norwalk Water Department.....	3-4
3.8 Heritage Village Water Company.....	3-4
3.9 Metropolitan District Commission.....	3-5
3.10 New Britain Water Department.....	3-5
3.11 New Hartford Water Department.....	3-5
3.12 Second Taxing District of Norwalk	3-6
3.13 South Central Connecticut Regional Water Authority.....	3-6
3.14 Southbury Training School	3-6
3.15 Torrington Water Company	3-7
3.16 Town of Newtown – Fairfield Hills	3-7
3.17 Waterbury Water Department	3-7
3.18 Watertown Fire District	3-7
3.19 Watertown Water & Sewer Authority	3-7

TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
3.20 Winsted Water Works.....	3-8
3.21 Wolcott Water Department.....	3-8
4.0 EXISTING SERVICE AREAS & DONOR BASINS	4-1
4.1 Existing Service Areas.....	4-1
4.2 Summary of Source Water and Service Areas	4-5
5.0 POPULATION AND PROJECTED GROWTH	5-1
5.1 Municipal Classifications and Community Water System Population	5-1
5.2 Historical Population.....	5-3
5.3 Municipal Population Projections.....	5-6
5.4 Community Water System Service Population Projections.	5-10
5.5 Land Uses and Available Land	5-12
5.5.1 Overview of the Western PWSMA	5-12
5.5.2 Land Uses within the Western PWSMA	5-13
5.6 Growth Trends	5-15
5.6.1 Housing Trends.....	5-15
5.6.2 Zoning.....	5-17
5.6.3 Conclusions.....	5-27
6.0 STATUS OF WATER SYSTEM PLANNING	6-1
6.1 Individual Water System Planning	6-1
6.2 Municipal Planning.....	6-2
6.3 Land Use Planning and Coordination for Source Protection	6-13
6.3.1 Community Water System Source Protection Efforts.....	6-13
6.3.2 Source Water Assessment Program	6-19
6.3.3 Regional Source Water Protection Efforts	6-20
6.3.4 Connecticut Source Water Collaborative	6-20
6.3.5 Aquifer Protection Area Program.....	6-21
6.3.6 Other Organizations	6-21
6.4 Coordination among Community Water Systems	6-21
7.0 ISSUES, NEEDS, AND DEFICIENCIES IN THE REGION	7-1
7.1 Sources of Supply	7-1
7.2 Planning.....	7-3
7.3 Interconnections	7-4
7.4 Small Water Systems.....	7-4
7.5 Water Usage.....	7-6
7.6 Final Thoughts.....	7-7

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF TABLES

Table 1-1	Coordinated Water System Plan Components and Schedule.....	1-3
Table 1-2	Western PWSMA Municipalities.....	1-7
Table 1-3	Summary of Population Served in Western PWSMA by Public Water Systems.....	1-9
Table 1-4	Summary of Comments Received on Preliminary Water Supply Assessment during Public Comment Period	1-10
Table 2-1	Summary of Western PWSMA Public Water System Service Areas by Municipality	2-1
Table 2-2	Summary of Recent Water Quality Violations for Community Systems (2014-2015)...	2-10
Table 2-3	Summary of Water Utility Concerns Regarding Water Quality for Utilities Serving > 1,000 People	2-13
Table 2-4	Summary of System Reliability Characteristics for Community Water Systems Serving >1,000 People	2-18
Table 2-5	System Demand, Available Yield, and Margin of Safety for Community Water Systems Serving >1,000 People	2-22
Table 2-6	Firefighting Capabilities by Municipality.....	2-24
Table 2-7	Major Facilities of Community Water Systems Serving > 1,000 People	2-27
Table 2-8	Planned and/or Identified Expansions/Alterations for Community Water Systems Serving > 1,000 People.....	2-29
Table 2-9	List of Existing Interconnections in the Western PWSMA.....	2-31
Table 2-10	Planned and/or Identified Future Interconnections.....	2-34
Table 2-11	Community Water Systems within 1,000 Feet without Existing or Planned Interconnections.....	2-35
Table 3-1	Potential Future Source of Supply Exploration Planned/Needed for Community Water Systems Serving >1,000 People	3-1
Table 4-1	Summary of Enabling Legislation for Community Water Systems Serving >1,000 People	4-1
Table 4-2	Generalized Summary of Donor Subregional Basins for Community Water Systems Serving > 1,000 People.....	4-5
Table 5-1	Summary of Municipal Characteristics for Western PWSMA.....	5-1
Table 5-2	Municipal Classification for Western PWSMA.....	5-3
Table 5-3	Historical Population by Municipality for the Western PWSMA	5-3
Table 5-4	Population Projections by Municipality for the Western PWSMA	5-6
Table 5-5	Existing and Future Projected Population of Community Water Systems Serving >1,000 People	5-10
Table 5-6	Land Cover by Category for the Western PWSMA	5-13
Table 5-7	Housing Inventory Estimates in Western PWSMA Municipalities, 2000-2015	5-15
Table 5-8	Generalized Zoning	5-17
Table 5-9	Municipal Buildout Analyses from Plans of Conservation and Development	5-21

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF TABLES (CONTINUED)

Table 6-1	Individual Water Supply Plan Status	6-1
Table 6-2	Summary of Municipal Plans of Conservation and Development	6-3
Table 6-3	Water Supply Comments Addressed in Municipal Plans of Conservation and Development	6-4
Table 6-4	Municipal Survey Responses.....	6-9

LIST OF FIGURES

Figure 1-1	Original PWSMAs	1-2
Figure 1-2	Western Region PWSMA	1-4
Figure 1-3	Population Distribution by Municipality	1-8
Figure 4-1	Small Public Water System Density	4-4
Figure 5-1	Population Growth by Municipality Classification.....	5-5
Figure 5-2	Population Projections by Classification for Western PWSMA	5-8
Figure 5-3	Western Region Land Cover	5-14

LIST OF APPENDED TABLES

Town-By-Town Summary of Public Water Systems and Potential Consolidations for the Western PWSMA	Appended Table 1
--	------------------

LIST OF APPENDED FIGURES

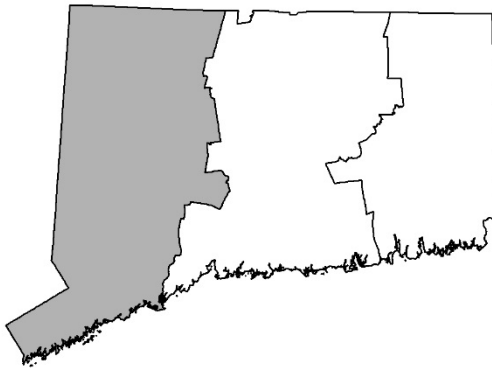
Small Community Public Water System Capacity Map	Appended Figure 1
Western PWSMA Overview	Appended Figure 2
Arsenic Concentrations above the Detection Limit in Public Water Supply Wells.....	Appended Figure 3
Combined Uranium Concentrations above the Detection Limit in Public Water Supply Wells	Appended Figure 4

TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES

Notifications.....	Appendix A
Western WUCC Member List.....	Appendix B
Summary of System Capabilities and Major Facilities for Community Systems Serving < 1,000 People	Appendix C
Summary of Margin of Safety for Community Systems Serving < 1,000 People.....	Appendix D
Public Comments Received on the Preliminary Water Supply Assessment.....	Appendix E
Summary of Capacity Development Assessment Scores.....	Appendix F

Coordinated Water System Plan Part II: Final Recommended Exclusive Service Area Boundaries Western Public Water Supply Management Area June 13, 2017



Prepared for:

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TABLE OF CONTENTS

	<u>Page</u>
Notice to Readers	i
Acknowledgements	ii
Table of Contents.....	iv
Definitions.....	vii
Abbreviations.....	ix
1.0 INTRODUCTION.....	1-1
1.1 Overview of Exclusive Service Area Process	1-1
1.2 Composition of the Western Public Water Supply Management Area	1-2
1.3 Enabling Legislation for Exclusive Service Area Holders	1-5
1.4 Public Comments	1-13
2.0 EXCLUSIVE SERVICE AREA DECLARATION PROCESS.....	2-1
2.1 Regulatory Mandate	2-1
2.2 Summary of the Declaration Process.....	2-2
2.2.1 Former Housatonic Public Water Supply Management Area	2-2
2.2.2 Former South Central Public Water Supply Management Area	2-4
2.2.3 Former Upper Connecticut River Public Water Supply Management Area	2-5
2.2.4 Western Public Water Supply Management Area	2-7
2.3 Confirmation of Recommended Boundaries	2-13
2.4 Undesignated Service Areas	2-13
2.5 Consideration of New Exclusive Service Area Holders for Currently Unserved Areas	2-16
2.5.1 Existing Water Service Area.....	2-16
2.5.2 Land Use Plans, Zoning Regulations, and Growth Trends	2-17
2.5.3 Physical Limitations to Water Service	2-20
2.5.4 Political Boundaries	2-22
2.5.5 Water Company Rights as Established by Statute, Special Act, or Administrative Decisions	2-23
2.5.6 System Hydraulics, Including Potential Elevations or Pressure Zones	2-24
2.5.7 Ability to Provide a Pure and Adequate Supply of Water Now and Into the Future	2-26
2.6 Potential Cost of Water Service to Residential Customers	2-30
3.0 EXCLUSIVE SERVICE AREA RIGHTS AND RESPONSIBILITIES.....	3-1
3.1 Overview of Rights and Responsibilities	3-1
3.2 Specific Rights and Responsibilities of the Exclusive Service Area Holder	3-2
3.3 Overview of the Certificate of Public Convenience and Necessity Process.....	3-5
3.4 Future Coordination Regarding Exclusive Service Area Boundaries.....	3-8

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF TABLES

Table 1-1	Coordinated Water System Plan Components and Schedule.....	1-4
Table 1-2	Western PWSMA Municipalities.....	1-4
Table 1-3	Summary of Enabling Legislation for Utilities and Municipalities Claiming Exclusive Service Areas for Areas Currently Unserved by Public Water Supply	1-6
Table 1-4	Summary of Comments Received on Preliminary ESA Document during Public Comment Period	1-14
Table 2-1	Summary of Milestones in the Exclusive Service Area Delineation Process, 1986-1987	2-2
Table 2-2	Former Housatonic PWSMA Exclusive Service Areas Inherited by Western PWSMA.....	2-3
Table 2-3	Summary of Milestones in the Exclusive Service Area Delineation Process, 1988-1989	2-4
Table 2-4	Former South Central PWSMA Exclusive Service Areas Inherited by Western PWSMA	2-5
Table 2-5	Summary of Milestones in the Exclusive Service Area Delineation Process, 1987-1988	2-6
Table 2-6	Former Upper Connecticut River PWSMA Exclusive Service Areas Inherited by Western PWSMA	2-6
Table 2-7	Summary of Milestones in the Exclusive Service Area Delineation Process, 2016-2017	2-7
Table 2-8	Final Recommended Exclusive Service Area Holders for Western PWSMA.....	2-11
Table 2-9	Potential Annual Cost of Residential Water Service in Currently Unserved Areas, by Town.....	2-30

LIST OF FIGURES

Figure 1-1	Western Region PWSMA	1-3
------------	----------------------------	-----

LIST OF APPENDED FIGURES

Western PWSMA Overview	Appended Figure 1
Statewide Map of ESA Boundaries	Appended Figure 2

TABLE OF CONTENTS (CONTINUED)

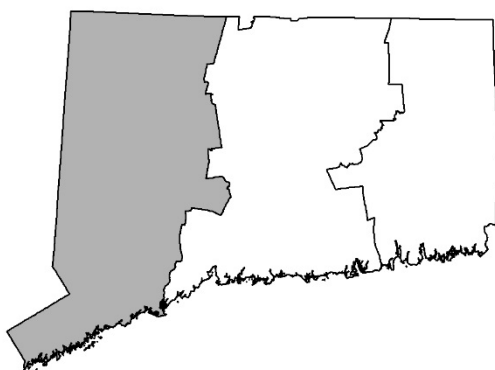
LIST OF APPENDICES

WUCC Correspondence and Supplemental Information.....	Appendix A
Summary of ESA Process for Former Housatonic WUCC.....	Appendix B
Summary of ESA Process for Former South Central WUCC.....	Appendix C
Summary of ESA Process for Former Upper Connecticut River WUCC	Appendix D
Statements of Confirmation and ESA Mapping	Appendix E
Public Comments Received on the Preliminary Exclusive Service Area Document	Appendix F

Coordinated Water System Plan Part III: Final Integrated Report

Western Public Water Supply Management Area

May 22, 2018



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TABLE OF CONTENTS

	<u>Page</u>
Notice to Readers	i
Acknowledgements	ii
Table of Contents.....	iv
Definitions.....	x
Abbreviations.....	xiii
1.0 INTRODUCTION.....	1-1
1.1 Overview of the Integrated Report.....	1-1
1.2 Overview of the Western Public Water Supply Management Area	1-4
1.3 Public Comments	1-5
2.0 CONTEXT AND COORDINATION OF PLANNING	2-1
2.1 Coordination of Planning	2-1
2.1.1 Disjointed Service Areas.....	2-1
2.1.2 Planning and Coordination among Public Water Systems	2-2
2.1.3 Planning Between Local Governments and Public Water Systems.....	2-2
2.1.4 Source Water Protection.....	2-4
2.1.5 Drought Planning and Response	2-5
2.2 Water Conservation	2-8
2.3 Impacts of Existing and Future Policies and Regulations.....	2-13
2.4 Climate Change and Resiliency	2-16
2.4.1 Climate Change and Effect on Safe Yield.....	2-16
2.4.2 Resiliency.....	2-17
2.4.3 Incorporation of Climate Change and Resiliency into Future Projects	2-20
3.0 POPULATION, CONSUMPTION, AND AVAILABLE WATER PROJECTIONS.....	3-1
3.1 Introduction	3-1
3.2 Town Population and Demand Projections	3-2
3.3 Town Public Water Service Population and ADD Projections.....	3-7
3.4 ESA Holder Public Water Service Population and Average Day Demand Projections	3-11
3.5 Public Water System Population and Demand Projections.....	3-11
3.5.1 Existing and Projected Service Population, Demands, and Available Water to Meet ADD.....	3-11
3.5.2 Deficits in Available Water to Meet ADD	3-14
3.5.3 Existing and Projected Service Population, Demands, and Available Water to Meet MMADD	3-19
3.5.4 Deficits in Available Water to Meet MMADD	3-21
3.6 Effect of Streamflow Standards and Regulations on Surface Water Supplies	3-24
3.7 Potential Solutions to Address Projected Available Water Deficits.....	3-30

TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
4.0 SATELLITE MANAGEMENT AND SMALL SYSTEM CHALLENGES	4-1
4.1 Satellite Management.....	4-1
4.2 Small System Challenges and Viability	4-4
4.3 Recommended Actions for Small Community Water Systems	4-8
4.4 Emergency Management, Communications, and Voluntary Associations	4-9
5.0 EXISTING AND POTENTIAL FUTURE INTERCONNECTIONS.....	5-1
5.1 Existing Interconnections in the Region.....	5-2
5.2 Interconnection Permitting Requirements	5-3
5.2.1 Sale of Excess Water Permits	5-4
5.2.2 Diversion Permitting Requirements	5-5
5.2.3 Interconnection Agreement Requirements	5-6
5.3 Potential Interconnections to Address Supply Deficits in the Region	5-7
5.3.1 Potential Interconnections to Meet ADD & MMADD through the 5 & 20-Year Planning Periods	5-10
5.3.2 Potential Interconnections to Meet ADD & MMADD through the 50-Year Planning Period.....	5-11
5.4 Potential Interconnections Recommended to Increase Resiliency in the Region.	5-11
5.4.1 Interconnections Recommended to Increase Source Resiliency for Large Systems..	5-12
5.4.2 Interconnections Recommended to Increase Source Resiliency for Small Systems ..	5-16
6.0 JOINT USE, MANAGEMENT, OR OWNERSHIP OF SERVICES, EQUIPMENT, AND FACILITIES	6-1
6.1 Existing and Planned Shared or Joint Use Facilities	6-1
6.2 Existing and Planned Joint Use of Services	6-2
6.3 Existing and Planned Joint Use or Ownership of Equipment.....	6-2
7.0 ANALYSIS AND PRIORITIZATION OF POTENTIAL FUTURE WATER SUPPLIES.....	7-1
7.1 Potential Groundwater Sources to Address Supply Deficits.....	7-2
7.2 Potential Surface Water Sources to Address Supply Deficits	7-3
7.3 Potential Groundwater Sources to Address New Water Demands.....	7-3
7.4 New Supply Development Implementation Strategy	7-3
7.5 Recommendations	7-5
8.0 POTENTIAL IMPACT ON OTHER USES OF WATER RESOURCES	8-1
8.1 Potential Impacts of Projects by Aquarion Water Company	8-1
8.2 Potential Impacts of Interconnection Projects for Active Daily Supply	8-4
8.3 Potential Impacts of Interconnection Projects for Resiliency.....	8-7

TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
9.0 MINIMUM DESIGN STANDARDS	9-1
9.1 Overview	9-1
9.2 Local Minimum Design Standards.....	9-1
9.3 Impact on Existing Systems.....	9-3
9.4 Conclusions and Recommendations	9-4
10.0 RELATIONSHIP AND COMPATIBILITY WITH OTHER PLANNING DOCUMENTS	10-1
10.1 Water Supply Plans	10-1
10.2 Local Plans of Conservation and Development	10-1
10.3 Regional Planning Documents	10-2
10.4 Conservation and Development Policies Plan for Connecticut	10-3
10.5 State Water Plan	10-4
11.0 FINANCIAL CONSIDERATIONS	11-1
11.1 Planning Cost Estimates for Implementation of Surface Water Supply Development	11-1
11.2 Planning Cost Estimates for Implementation of Groundwater Supply Development.....	11-2
11.3 Planning Cost Estimates for Implementation of Interconnections.....	11-4
11.4 Financing Issues	11-5
11.4.1 Financial Operation of Public Water Systems	11-5
11.4.2 Funding of Public Water System Operations and Maintenance	11-6
11.5 Potential Funding Sources for Capital Improvement Projects.....	11-7
11.5.1 Drinking Water State Revolving Fund.....	11-8
11.5.2 Small Town Economic Assistance Program	11-9
11.5.3 United States Department of Agriculture Rural Development Water & Environmental Programs	11-10
11.5.4 United States Economic Development Administration.....	11-10
11.5.5 FEMA Hazard Mitigation Assistance Program	11-11
11.5.6 Other Agencies	11-11
12.0 RECOMMENDATIONS AND PRIORITIZATION	12-1
12.1 Prioritization and Implementation of Recommendations.....	12-2
12.2 Prioritization and Cost of Capital Improvement Projects	12-2

TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
LIST OF TABLES	
Table 1-1	Western PWSMA Towns 1-4
Table 1-2	Summary of Comments Received on the Preliminary Integrated Report and Preliminary Executive Summary during Public Comment Period 1-5
Table 3-1	Summary of Regional Community Water System ADD Projections, Available Water, and MOS..... 3-2
Table 3-2	Population Projections by Town for the Western PWSMA 3-3
Table 3-3	Estimated Residential ADD for Total Population by Town for the Western PWSMA..... 3-6
Table 3-4	Projected Town Population versus Residential Water Service Population..... 3-8
Table 3-5	Existing and Projected ADD for Public Water Systems by Town 3-10
Table 3-6	Existing and Projected Residential Service Population by ESA Holder 3-12
Table 3-7	Existing and Projected ADD for Exclusive Service Areas by ESA Holder 3-13
Table 3-8	Existing and Projected MMADD 3-20
Table 3-9a	System Margin of Safety to Meet MMADD 3-22
Table 3-9b	System Margin of Safety to Meet MMADD with Water Conservation 3-23
Table 3-9c	System Margin of Safety to Meet MMADD with Water Conservation and Available Water Guidance 3-25
Table 3-10ab	Reservoir Systems and Potential Available Water Reductions Due to Required Streamflow Releases 3-27
Table 3-10c	Reservoir Systems and Potential Available Water Reductions Due to Required Streamflow Releases with Available Water Guidance 3-27
Table 3-11a	Available Water Surplus or Deficit for Reservoir Systems Accounting for Required Streamflow Releases 3-29
Table 3-11b	Available Water Surplus or Deficit for Reservoir Systems Accounting for Required Streamflow Releases and Water Conservation 3-29
Table 3-11c	Available Water Surplus or Deficit for Reservoir Systems Accounting for Required Streamflow Releases, Water Conservation, and Available Water Guidance 3-31
Table 3-12a	Summary of Available Water Deficits 3-32
Table 3-12b	Summary of Available Water Deficits with Water Conservation 3-33
Table 3-12c	Summary of Available Water Deficits with Water Conservation and Available Water Guidance..... 3-35
Table 3-13	Summary of Projected Water Need to Meet MMADD with a MOS of 1.15 3-36
Table 3-14	Corrected Summary of Projected Water Need to Meet MMADD with a MOS of 1.15 3-37
Table 4-1	Entities Willing to Provide Contract Operation Services to Public Water Systems 4-1
Table 4-2	Satellite Management Needs and Opportunities of ESA Providers 4-2

TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
Table 5-1	List of Active Interconnections in the Western PWSMA Providing Transfer of Water 5-2
Table 5-2	List of Existing Emergency Interconnections in the Western PWSMA 5-3
Table 5-3	Sale of Excess Water Permits Issued by DPH 5-4
Table 5-4	Interconnections Listed in Water Supply Plans and High Quality Source List that are Located in the Western PWSMA 5-9
Table 7-1	Potential Sources of Supply for Systems Projecting Significant Supply Deficits 7-2
Table 8-1	Generalized Summary of Donor Sub-Regional Basins for Community Water Systems that May be Interconnected to Address Potential Deficits 8-5
Table 12-1	Prioritization and Implementation of Non-Capital Improvement Recommendations 12-3

LIST OF FIGURES

Figure 2-1	Resiliency Loss Curve 2-19
Figure 3-1	2017 CT SDC Population Projections for Western PWSMA by Community Type 3-3
Figure 5-1	Regionally Interconnected Large Water Systems 5-13

LIST OF APPENDED TABLES

Appended Table 1	Existing ADD and Available Water for Community Water Systems
Appended Table 2	5-Year (2023) Projected ADD and Existing Available Water for Community Water Systems
Appended Table 3	20-Year (2030) Projected ADD and Existing Available Water for Community Water Systems
Appended Table 4	50-Year (2060) Projected ADD and Existing Available Water for Community Water Systems

LIST OF APPENDED FIGURES

Regional Map	Appended Figure 1
--------------------	-------------------

TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES

Public Comments Received on the Preliminary Integrated Report	Appendix A
Summary of Process Used to Project Public Water Demands	Appendix B
Adjustment of CT SDC Municipal Population Projections	Appendix C
Summary of Small Community System Options	Appendix D