



Coordinated Water System Plan

Part IV: Preliminary Executive Summary

Central Connecticut Public Water Supply Management Area

March 15, 2018



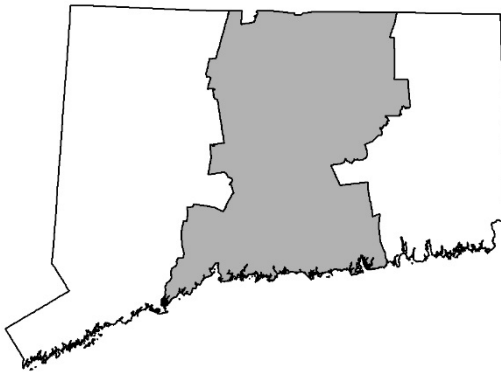
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Prepared for:

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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 Central 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 regularly attended Central Connecticut WUCC meetings or provided written comments on the process.

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Connecticut Water Company	New Britain Water Department
Cromwell Fire District	Portland Water Department
Town of Durham	South Central Connecticut Regional Water Authority
Town of East Haddam	South Central Region Council of Governments
East Hampton Water Pollution Control Authority	Southington Water Department
Town of Haddam	Tolland Water Commission
Hazardville Water Company	Wallingford Water Division
Lower Connecticut River Valley Council of Governments	

Other Meeting Attendees

The Central Connecticut WUCC also appreciates the time and effort of the numerous non-member stakeholders who participated in and have contributed valuable insight to this process:

Stakeholders	Stakeholders
Connecticut Department of Energy & Environmental Protection	Members of the Public
Connecticut Department of Public Health	Prime AE Group
Connecticut Office of Policy & Management	Quinnipiac River Watershed Association
Connecticut River Watershed Council	Rivers Alliance of Connecticut
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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 – 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 and ensures the availability of water throughout a period of drought and 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. Exclusive service area boundaries comprise Part II of the areawide supplement. As part of the exclusive service area assignment process, all existing public water systems automatically receive an exclusive service area 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 exclusive service area 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 which 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 – 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 Community Water System. 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 Non-Transient Non-Community Water Systems unless sufficient service is available to meet the definition of a Community Water System 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 – An evaluation of water supply conditions and problems within the public water supply management area. 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

A4WE	Alliance for Water Efficiency
ADD	Average Daily Demand
AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
APA	Aquifer Protection Area
ASRWVA	Atlantic States Rural Water and Wastewater Association
AWC	Aquarion Water Company
CAT	Capacity Assessment Tool
CEPA	Connecticut Environmental Policy Act
CGS	Connecticut General Statute(s)
CIRCA	Connecticut Institute for Resilience and Climate Adaptation
CPCN	Certificate of Public Convenience and Necessity
CRCOG	Capitol Region Council of Governments
CT SDC	Connecticut State Data Center
CWC or CTWC	Connecticut Water Company
CWS or CWSs	Community Water System(s)
DEEP	Department of Energy & Environmental Protection
DPH	Department of Public Health
DWQMP	Drinking Water Quality Management Plan
DWSRF	Drinking Water State Revolving Fund
EPA	Environmental Protection Agency
ESA or ESAs	Exclusive Service Area(s)
FEMA	Federal Emergency Management Agency
FOIA	Freedom of Information Act
GMP	Growth Management Principle
gpcd	gallons per capita per day
gpd	gallons per day
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
NTNC	Non-Transient Non-Community
OPM	Office of Policy and Management
PDD	Peak Day Demand
POCD or POCDs	Plan(s) of Conservation and Development
PURA	Public Utilities Regulatory Authority
PWSMA	Public Water Supply Management Area
RCSA	Regulations of Connecticut State Agencies
RGQ80	Rearing and Growth 80% duration flow
RiverCOG	Lower Connecticut River Valley Council of Governments
SCCRWA	South Central Connecticut Regional Water Authority

ABBREVIATIONS (Continued)

SCRCOG	South Central Region Council of Governments
STEAP	Small Town Economic Assistance Program
SWAP	Source Water Assessment Program
TNC	Transient Non-Community
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEDA	United States Economic Development Administration
USGS	United States Geological Survey
WICA	Water Infrastructure and Conservation Adjustment
WPCA	Water Pollution Control Authority
WSA	Water Supply Assessment
WSP or WSPs	Water Supply Plan(s)
WUCC or WUCCs	Water Utility Coordinating Committee(s)
WWW	Windham Water Works



SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS

This document presents the Executive Summary of the coordinated public water system planning process in the Central Public Water Supply Management Area (PWSMA). The region is comprised of 70 towns within which approximately 200 community public water systems and 751 non-community public water systems currently operate. The Central Water Utility Coordinating Committee (the WUCC) convened on June 15, 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 *Preliminary Integrated Report* and the subject *Executive Summary* (documents published in March 2018 for public review). The first two documents have been formally endorsed and adopted by the WUCC, with formal endorsement and adoption of the more recent documents to follow receipt and consideration of public comments (Appendix A). The table of contents for each of the first three components of the *Coordinated Water System Plan* (CWSP) is included as Appendix B.

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 to be un-redacted for public viewing. DPH will be requesting that utilities provide redacted and un-redacted copies of new water supply plans in accordance with the public act that can be made available for public distribution, while DPH would request redacted copies of old plans as necessary to meet 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 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 reservoir systems, compliance with the Streamflow Standards and Regulations will be required in the Central PWSMA by 2030;
- For many utilities, a heightened focus on water conservation 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 is 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.

The DWQMP process is recommended for CWC, MDC, SCCRWA, Windham Water Works (WWW), and others to improve source water protection in their public water supply watersheds.

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 0.6 million gallons per day (mgd), 1.4 mgd, and 20.5 mgd respectively over the five-year, 20-year, and 50-year planning horizons, primarily to meet MMADD.

The majority of the ADD need has been identified by Connecticut Water Company (CWC) in the five-year planning horizon (2023), with the East Hampton WPCA potentially needing increased supply in the 20-year planning horizon (2030), and Southington Water Department and Tolland Water Department projecting significant water need in the 50-year planning horizon (2060). Note that the long-term projection assumes that MDC would need to comply with the release requirements of the Streamflow Standards and Regulations, such that the utility would require 15.5 mgd of new supply in such a

scenario. These needs are based on utility projections and the current method for calculating available water for each system.

New supply sources are needed throughout 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 connected to the regionally interconnected water system in southeastern Connecticut. Several of the areas that 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 6 mgd may be available if all identified sources are developed. 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, potential supply is theoretically capable of meeting demands. However, financial, environmental, and regulatory obstacles 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 0.6 mgd, 1.0 mgd, and 3.5 mgd over the three planning horizons, primarily to meet MMADD. The use of targeted water conservation and water efficiency measures and programs for these utilities is expected to further reduce the potential need for new supply sources, 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.

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

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, implementing targeted water conservation and water efficiency measures, authorizing reasonable additive factors to be included in available water when calculating margin of safety (MOS) for MMADD, developing interconnections or new sources to be transferred through interconnections, and developing new sources of supply. The use of targeted water conservation and water efficiency measures could be a primary driver towards reducing projected water demands and water supply deficits in the region. When development of new sources of supply is necessary in the future, the Central WUCC has a variety of regionally-significant source of supply options to evaluate.

The use of available water guidance for reservoir systems, for supplemental supply wells, and for interconnections that applies a maximum month flow rate that is 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 CWC-Unionville system would no longer have a deficit to meet MMADD in the five-year or 20-year planning horizon, and that deficits for other systems could be reduced. The projected supply need for CWSs in the region including both passive water conservation measures and potential MMADD guidance resulted in a reduction to 0.03 mgd, 0.4 mgd, and 2.9 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, it does demonstrate how the need for new sources 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 margin of safety to meet MMADD that are 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 continues to be a concern. Recent DPH efforts to identify systems with inadequate capacity have been greatly beneficial for both planning and regulatory purposes.

The Capacity Assessment Tool (CAT) is being used by DPH to evaluate the technical, managerial, and financial capacity of small community water systems. 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.

DPH is encouraged to continue updating the CAT for small CWSs and regularly advise ESA holders of low capacity CWSs within their exclusive service area (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 is necessary in order to ensure capital improvements can be performed per the schedule for proper asset management.

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.

Many of the smaller community public water systems 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.

Finding #6: The two-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:

- Interconnections of small CWS nearby larger utilities where interconnection is found to be the preferred option for daily supply, or for emergency purposes (Section 4.3, Section 5.3);
- Consolidation of CWC-Collinsville and CWC-Unionville systems (Section 5.3);
- Development of new supply source(s) and interconnection to serve proposed East Hampton WPCA system (Section 5.3, Section 7.1, Section 7.2);
- Extension of CWC-Guilford system and consolidation of shoreline systems (including single-wellfield systems) in Old Lyme, with interconnection to East Lyme (Section 5.3, Section 5.4), potentially through development of regionally significant sources of supply (Section 7.1);
- Development of interconnections for Southington Water Department (Section 5.3, Section 5.4);
- Development of interconnection between Middletown Water Department and Connecticut Valley Hospital which utilizes a single distribution reservoir (Section 5.4);
- Development of an interconnection with WWW which utilizes a single reservoir (Section 5.4);
- Development of emergency interconnections to extend the regionally-interconnected water system in the region (utilities to consider interconnections include AWC – Simsbury and Avon Water Company, AWC – Simsbury and Salmon Brook District Water Department, Berlin Water Control Commission and Meriden Water Division, Connecticut Correctional Institute and CWC – Western, Cromwell Fire District and MDC, Hazardville Water Company and CWC – Western, Manchester

Water Department and CWC – Western and/or MDC, Middletown Water Department with Berlin Water Control Commission and Cromwell Fire District, Wallingford Water Division and Meriden Water Division (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); and
- Joint development of new supply sources by multiple utilities (Section 6.1).

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

Topic Area	Goal	Recommended Strategy	Lead(s)	Timeframe
Responsible Planning	Prevent proliferation of water systems when other options are available	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
		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
	Work towards constructive changes to statutes and regulations	Explore and provide recommendations regarding appropriate modifications to the defintion 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
		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
		Review the State's minimum design criteria for new public water systems every five years to ensure the development of reliable water systems with proper technical, managerial, and financial capcity	WUCC, DPH	1st Review By 2023
		Explore and provide recommendations regarding regulations to ensure the standardized and consistent development of new non-community water systems	DPH	By 2023
		Consider development of a streamlined CPCN process for small utilities desiring a minimal degree of expansion instead of the five-percent rule	WUCC, DPH	By 2023
		Review data requirements for WSPs, CWSPs, and State water planning needs (e.g. basin-level withdrawal and return flow data) to determine if revisions to the data requirements are necessary to ensure submission of data that is useful for multiple planning purposes	WUCC, DPH	By 2030
	Develop and use best-available data	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
		Provide annual updates to the WUCC on the status of small systems based on the CAT	DPH, WUCC	Ongoing
		Keep WUCC informed regarding potentially regionally-significant water supply sources	Utilities	Ongoing
		Revise water demand projections that may be out of date	Utilities	By 2023
		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
		Encourage local planners to identify in POCDs areas where public water service is desired	Utilities, COGs	Ongoing
		Provide Geographic Information System data appropriate for regional planning to Councils of Governments, including ESA boundaries and general public water system service locations	DPH	Ongoing
		Review and improve accuracy of spatial data regarding the locations of non-community water systems	DPH	By 2023
		Consider requiring all public water systems to report water usage on an annual basis	DPH, WUCC	By 2023
		Encourage PURA and DPH 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	Require training in asset management for small water system owners	DPH	By 2023
		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
		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
		Encourage small systems to work with non-profit orgnaizations such as RCAP solutions or the ASRWWA 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
Source Protection	Encourage prudent development and conservation of existing large, protected watersheds	Implement the DWQMP process (potential candidate utilities include CWC, MDC, SCCRWA, and WWW)	Utilities, DPH	By 2023
		Pursue modification of CGS 8-30g to more strongly consider source water protection concerns in reservoir watersheds and APAs	DPH	By 2023
		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
	Improve stormwater quality in watersheds and aquifer recharge areas	Promote the adoption of best management practices for the use of green infrastructure in stormwater management design	Utilities	By 2023
		Improve collaboration with local plowing contractors, public works staff, and the State Department of Transporation to minimize chloride impacts to public water supply sources	Utilities	By 2023
	Consider methods to improve enforcement capabilities	Evaluate and provide remcommendations for methods of improving enforcement to prevent activities on private property that may lead to reservoir or aquifer contamination	WUCC, DPH	By 2023
Drought Management	Consider methods to improve enforcement of water use restrictions	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 restriction measures	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: Implementation of Non-Capital Improvement Recommendations

Topic Area	Goal	Recommended Strategy	Lead(s)	Timeframe
Water Conservation	Consider and encourage methods for water systems to utilize to enhance water efficiency	Explore and provide recommendations regarding various methods of reducing unaccounted-for water	WUCC	Ongoing
		Explore and provide recommendations regarding the use of alternative methods for tracking water usage, water loss, and waste	WUCC	Ongoing
		Explore and provide recommendations regarding the use of outdoor water use restrictions to be applied seasonally	WUCC	Ongoing
		Encourage utilities to modify rate structures to promote water conservation while covering the full cost to provide water	Utilities	Ongoing
		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
		Develop and enact targeted water conservation and water efficiency programs	Utilities, DPH	By 2023
	Consider alternative means to supply non-potable uses	Encourage the use of Class B water for non-potable uses within service area boundaries	WUCC	Ongoing
		Encourage the use of gray water reuse systems in new developments to reduce demands on potable water	WUCC	Ongoing
	Consider legislation to improve water conservation	Explore and provide recommendations regarding state and local legislation to further regulate demand-side water conservation	WUCC	By 2030
	Encourage dissemination of water conservation information	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	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	1st Review By 2030
		Encourage DEEP to monitor regional groundwater levels to detect trends that may impact safe yield	WUCC	Ongoing
	Correct disparities in existing regulations	Explore and provide recommendations regarding updating the public health code to require new wells to be elevated to the 0.2% annual chance flood elevation (which may already be required by the State's flood regulations)	WUCC, DPH	By 2030
	Improve resiliency of public water systems	Develop redundant infrastructure, backup power, increased system storage, and conduct more comprehensive emergency response planning to improve resiliency	Utilities	Ongoing
		Encourage small systems with the potential to develop emergency interconnections to do so	Utilities	Ongoing
		Initiate planning for development of interconnections or new supply sources for systems with only one source of supply (reservoir or wellfield)	WUCC, Utilities	By 2023
		Develop procedures and secure permits to promote 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)	Utilities	Ongoing
		Assist systems in conducting asset management planning and developing formal infrastructure replacement programs	DPH	Ongoing
	Develop and use best-available data	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	Develop a dedicated source of grant funding to allow for the consolidation of small water systems located in close proximity	DPH	Immediately
		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
		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
		Conduct regular seminars on financial management and the types of funding available for capital improvement projects	DPH	Ongoing
		Develop a dedicated source of grant funding for small system improvements	DPH	Immediately
		Develop a dedicated source of grant funding for regional water supply solutions	DPH	Ongoing
		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	Encourage the use of the Intertown Capital Equipment Purchase Incentive Program (for municipal systems) as well as other arrangements to share equipment, resources, and operational staff and increase purchasing power	WUCC	Ongoing



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 water supply plans (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 greater 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 five to nine 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 subject document represents the WSA, 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 *Preliminary Integrated Report* was completed in February 2018.

Executive Summary – The *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 Central Connecticut PWSMA encompasses all of the towns that are included within the boundaries of the Capitol Region Council of Governments (CRCOG), South Central Region Council of Governments (SCRCOG), and the Lower Connecticut River Valley Council of Governments (RiverCOG) regional councils of government. The boundaries of the PWSMA are generally defined by the Massachusetts state boundary to the north; the boundaries of the Western PWSMA and the Eastern PWSMA to the west and east, respectively; and Long Island Sound to the south. The towns within the Central PWSMA are listed in Table 1-1, with towns along the western and eastern boundaries denoted by an asterisk as these communities may coordinate on water supply issues with towns or utilities in the Western or Eastern PWSMAs. In total, the Central PWSMA comprises 70 towns.

TABLE 1-1
Central PWSMA Towns

Central PWSMA Towns				
Andover	Durham	Haddam	New Britain	Southington*
Avon*	East Granby	Hamden*	New Haven	Stafford^
Berlin	East Haddam^	Hartford	Newington	Suffield
Bethany*	East Hampton^	Hebron^	North Branford	Tolland
Bloomfield	East Hartford	Killingworth	North Haven	Vernon
Bolton	East Haven	Lyme^	Old Lyme^	Wallingford*
Branford	East Windsor	Madison	Old Saybrook	West Hartford
Canton*	Ellington	Manchester	Orange*	West Haven
Chester	Enfield	Mansfield^	Plainville*	Westbrook
Clinton	Essex	Marlborough^	Portland	Wethersfield
Columbia^	Farmington*	Meriden*	Rocky Hill	Willington^
Coventry^	Glastonbury	Middlefield	Simsbury	Windsor
Cromwell	Granby*	Middletown	Somers	Windsor Locks
Deep River	Guilford	Milford*	South Windsor	Woodbridge*

*Denotes municipality that is on the border with the Western PWSMA

^Denotes municipality that is on the border with the Eastern PWSMA

The Central Connecticut PWSMA consists of 951 public water systems as of September 2017. Refer to Appended Figure 1 for a map depicting the general location of these systems. Of these:

- 200 are regulated as community water systems (CWSs).
- 222 are regulated as non-transient non-community (NTNC) water systems.
- 529 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 34 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 Central PWSMA was published in December 2016. The document presented an inventory of existing community public water systems 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 Central Connecticut to their 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 Central PWSMA is considered to be generally good. At the time of the WSA (data through 2015), most public water systems serving greater than 1,000 people had multiple sources of supply and/or emergency/backup supplies. Twenty-one out of 34 of these systems currently have interconnections with another system. Additionally, all of the large public systems serving greater than 1,000 people had emergency power availability and an average-day MOS that was greater than the recommended 1.15. Only four such systems had a maximum month average-day margin of safety that was less than 1.15. For one of these systems (UConn), a new interconnection source of supply was recently constructed. Four 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 129 small community systems in the Central PWSMA that had been assessed at the time of the WSA, 8 percent of the systems were rated to be lacking adequate capacity, 50 percent were rated to have moderate capacity, and 42 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 community water systems.

Existing and Future Sources of Supply

Thirteen of the 34 systems serving greater than 1,000 people maintain active reservoir supplies. Only five of these rely solely on reservoir supplies. Most of the public water served through these systems comes from groundwater supplies. Ten systems that currently supply greater 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). Twenty-three 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*. Six 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 Central PWSMA include Hartford and New Haven, with greater than 80,000 people, and Enfield, West Hartford, East Hartford, Manchester, New Britain, Southington, Meriden, Middletown, Wallingford, Hamden, West Haven, and Milford, with populations between 40,000 and 80,000 people. The lowest population areas within the region include Bolton, Andover, Middlefield, Chester, Deep River, and Lyme, with populations of fewer than 5,000 people according to the 2010 Census.

Seventy-eight percent of the land area in the Central PWSMA is undeveloped; 22 percent is developed, with concentrations along the Connecticut River Valley 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 postrecession recovery in 2006 to 2015.

Status of Planning

Most water utilities have a WSP that has been approved in the last 5 years, and Plans of Conservation and Development (POCDs) have been prepared in all member towns. Most were adopted within the last 10 years. Most community plans, such as zoning regulations and plans of conservation and development, 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 Central 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

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 noted above 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 Central PWSMA was provided the opportunity to request ESA designations beyond their existing system boundaries that cover areas currently unserved by public water supply.

The Central PWSMA inherited the ESA boundary delineations established under CGS Section 25-33g for the former Southeastern Connecticut WUCC, South Central WUCC, and Upper Connecticut River WUCC. The ESA boundary delineations for the former Southeastern Connecticut WUCC were finalized in March 2001 and ultimately approved by DPH, while the remaining ESA boundaries were recommended as part of unapproved CWSPs developed in the late 1980s. Several modifications were approved by the former WUCCs prior to the consolidation of the former regions into the Central PWSMA in 2014. These modifications are incorporated into this document. Future ESA modifications will be processed by the Central 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, as well as 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 Exclusive Service Area providers by town. Recommended exclusive service area boundaries are delineated in the appended mapping.

TABLE 2
Final Recommended Exclusive Service Area Holders in Central PWSMA

Geographic Area	ESA Holders for Unserved Areas
Andover	AWC for all unserved areas in Andover
Avon	Avon Water Company throughout all but the western portion of town and CWC for the western portion of town
Berlin	Berlin Water Control Commission for areas in eastern, southern, and western Berlin; Kensington Fire District for areas in Kensington Fire District; City of New Britain (New Britain Water Department) near and around its existing service area in northern Berlin; and Worthington Fire District for areas in Worthington Fire District
Bethany	SCCRWA
Bloomfield	MDC
Bolton	Town of Bolton for selected town-owned parcels. CWC for areas north of Route 44 and within 200 feet of the south side of Route 44 and for certain areas along Route 6. Remainder of town unassigned
Branford	SCCRWA
Canton	CWC for all except the northeastern corner and AWC in the northeastern corner of town
Chester	CWC
Clinton	CWC
Columbia	CWC for the area currently served by its Columbia Heights system. AWC for the remainder of town.
Coventry	Town of Coventry for town-owned parcels with existing water systems. CWC for the remainder of Coventry.
Cromwell	Cromwell Fire District
Deep River	CWC
Durham	Town of Durham for all areas generally in the northern portion of Durham and CWC for all areas generally in southern Durham
East Granby	CWC for eastern edge of town; MDC for northwest, north, central, east-central, and southern parts of town; and AWC for southwestern East Granby
East Haddam*	Town of East Haddam with the exception of the area immediately surrounding the CWC Banner Village and CWC Lake Hayward systems to be served by CWC
East Hampton	Town of East Hampton (WPCA) for entire town* with the exception of an area east of Lake Pocotopaug near the CWC Baker Hill Division assigned to CWC* and AWC for the northernmost area in East Hampton
East Hartford	MDC
East Haven	SCCRWA
East Windsor	CWC
Ellington	CWC
Enfield	CWC in western and northern Enfield and the southeastern corner of Enfield; Hazardville Water Company in central, southern, and eastern Enfield
Essex	CWC
Farmington	MDC for a portion of eastern Farmington, City of New Britain (New Britain Water Department) for much of southeastern Farmington, CWC in all of central and western Farmington, and Valley Water Systems for a small area in southeastern Farmington
Glastonbury	MDC for most of Glastonbury with the exception of the Town of Manchester (Manchester Water Department) in north-central Glastonbury
Granby	AWC
Guilford	CWC
Haddam	CWC

TABLE 2
Final Recommended Exclusive Service Area Holders in Central PWSMA

Geographic Area	ESA Holders for Unserved Areas
Hamden	SCCRWA
Hartford	MDC
Hebron*	CWC
Killingworth	CWC
Lyme*	CWC
Madison	CWC
Manchester	Town of Manchester (Manchester Water Department) for all areas, except for a small area on the western border assigned to MDC
Mansfield	Windham Water Works for a specific area near its existing system in southern Mansfield. CWC for the remaining area within the Town of Mansfield. The University of Connecticut will retain its existing service area designation for its Main and Depot campus areas, with no underlying ESA, and agricultural land that is not contiguous with the existing service area at the Main and Depot campuses will remain unassigned.
Marlborough*	Town of Marlborough
Meriden	Meriden Water Division
Middlefield	Town of Middlefield
Middletown	City of Middletown (Middletown Water Department)
Milford	SCCRWA
New Britain	City of New Britain (New Britain Water Department)
New Haven	SCCRWA
Newington	MDC for the majority of town with the exception of two areas in western Newington designated for the City of New Britain (New Britain Water Department). Two areas on the western border were left unassigned.
North Branford	SCCRWA
North Haven	SCCRWA
Old Lyme*	CWC
Old Saybrook	CWC
Orange	SCCRWA
Plainville	Valley Water Systems
Portland	Town of Portland (Portland Water Department)
Rocky Hill	MDC
Simsbury	Avon Water Company for the south-central portion of Simsbury near its existing service area along the Avon boundary and AWC for the remainder of town
Somers	CWC for the northwestern, southwestern, central, southern, and southeastern parts of town, and Hazardville Water Company for the northern and western parts of town
Southington	Town of Southington (Southington Water Department) for all of the town except a small area in northeastern Southington previously assigned to the City of New Britain (New Britain Water Department) near Caretaker Road
South Windsor	CWC for the northern and eastern portions of town, and MDC for essentially the southwestern quarter of town
Stafford	CWC for all unserved areas in Stafford
Suffield	CWC
Tolland	CWC for areas in the northwestern portion of town, and the Town of Tolland (Tolland Water Department) for the remainder of Tolland.
Vernon	CWC for nearly all of town, except for a small area assigned to the Town of Manchester (Manchester Water Department) in southern Vernon

TABLE 2
Final Recommended Exclusive Service Area Holders in Central PWSMA

Geographic Area	ESA Holders for Unserved Areas
Wallingford	Town of Wallingford (Wallingford Water Division)
Westbrook	CWC
West Hartford	MDC
West Haven	SCCRWA
Wethersfield	MDC
Willington	CWC, except for an area of state land in southern Willington, which will remain unassigned
Windsor	MDC
Windsor Locks	CWC for most of town, except for a small area in the southeastern corner designated to MDC
Woodbridge	SCCRWA

*Denotes ESA boundaries approved by DPH that were inherited from former Southeastern WUCC



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 1980's and 1990's. At that time, the urban areas began to lose population, 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 Central PWSMA

Town	Classification	1960	1970	1980	1990	2000	2010
Andover	Suburban	1,771	2,099	2,144	2,540	3,036	3,303
Avon	Suburban	5,273	8,352	11,201	13,937	15,832	18,098
Berlin	Suburban	11,250	14,149	15,121	16,787	18,215	19,866
Bethany	Suburban	2,384	3,857	4,330	4,608	5,040	5,563
Bloomfield	Suburban	13,613	18,301	18,608	19,483	19,587	20,486
Bolton	Suburban	2,933	3,691	3,951	4,575	5,017	4,980
Branford	Urban	16,610	20,444	23,363	27,603	28,683	28,026
Canton	Suburban	4,783	6,868	7,635	8,268	8,840	10,292
Chester	Suburban	2,520	2,982	3,068	3,417	3,743	3,994
Clinton	Suburban	4,166	10,267	11,195	12,767	13,094	13,260
Columbia	Suburban	2,163	3,129	3,386	4,510	4,971	5,485
Coventry	Suburban	6,356	8,140	8,895	10,063	11,504	12,435
Cromwell	Urban	6,780	7,400	10,265	12,286	12,871	14,005
Deep River	Suburban	2,968	3,690	3,994	4,332	4,610	4,629
Durham	Suburban	3,096	4,489	5,143	5,732	6,627	7,388
East Granby	Suburban	2,434	3,532	4,102	4,302	4,745	5,148
East Haddam	Suburban	3,637	4,676	5,621	6,676	8,333	9,126
East Hampton	Suburban	5,403	7,078	8,572	10,428	13,352	12,959
East Hartford	Urban	43,977	57,583	52,563	50,452	49,575	51,252
East Haven	Urban	21,388	25,120	25,028	26,144	28,189	29,257
East Windsor	Suburban	7,500	8,513	8,925	10,081	9,818	11,162
Ellington	Suburban	5,580	7,703	9,711	11,197	12,921	15,602
Enfield	Urban	31,464	46,189	42,695	45,532	45,212	44,654
Essex	Suburban	4,057	4,911	5,078	5,904	6,505	6,683
Farmington	Suburban	10,813	14,390	16,407	20,608	23,641	25,340
Glastonbury	Suburban	14,497	20,651	24,327	27,901	31,876	34,427
Granby	Suburban	4,968	6,150	7,956	9,369	10,347	11,282
Guilford	Suburban	7,913	12,033	17,375	19,848	21,398	22,375
Haddam	Suburban	3,466	4,934	6,383	6,769	7,157	8,346
Hamden	Urban	41,056	49,357	51,071	52,434	56,913	60,960
Hartford	Urban	162,178	158,017	136,392	139,739	121,578	124,775
Hebron	Suburban	1,819	3,815	5,453	7,079	8,610	9,686
Killingworth	Suburban	1,098	2,435	3,976	4,814	6,018	6,525
Lyme	Rural	1,183	1,484	1,822	1,949	2,016	2,406
Madison	Suburban	4,567	9,768	14,031	15,485	17,858	18,269
Manchester	Urban	42,102	47,994	49,761	51,618	57,740	58,241
Mansfield	Suburban	14,638	19,994	20,634	21,103	20,720	26,543

TABLE 3
Historical Population by Town for the Central PWSMA

Town	Classification	1960	1970	1980	1990	2000	2010
Marlborough	Suburban	1,961	2,991	4,746	5,513	5,709	6,404
Meriden	Urban	51,850	55,959	57,118	59,479	58,244	60,868
Middlefield	Suburban	3,255	4,132	3,796	3,925	4,203	4,425
Middletown	Urban	33,250	36,924	39,040	42,762	43,167	47,648
Milford	Urban	41,662	50,858	50,898	49,938	52,305	52,759
New Britain	Urban	82,201	83,441	73,840	75,491	71,538	73,206
New Haven	Urban	152,048	137,707	126,109	130,474	123,626	129,779
Newington	Urban	17,664	26,037	28,841	29,208	29,306	30,562
North Branford	Suburban	6,771	10,778	11,554	12,996	13,906	14,407
North Haven	Urban	15,935	22,194	22,080	22,247	23,035	24,093
Old Lyme	Suburban	3,068	4,964	6,159	6,535	7,406	7,603
Old Saybrook	Suburban	5,274	8,468	9,287	9,552	10,367	10,242
Orange	Suburban	8,547	13,524	13,237	12,830	13,233	13,956
Plainville	Urban	13,149	16,733	16,401	17,392	17,328	17,716
Portland	Suburban	7,496	8,812	8,383	8,418	8,732	9,508
Rocky Hill	Urban	7,404	11,103	14,559	16,554	17,966	19,709
Simsbury	Suburban	10,138	17,475	21,161	22,023	23,234	23,511
Somers	Suburban	3,702	6,893	8,473	9,108	10,417	11,444
South Windsor	Suburban	9,460	15,553	17,198	22,090	24,412	25,709
Southington	Urban	22,797	30,946	36,879	38,518	39,728	43,069
Stafford	Suburban	7,476	8,680	9,268	11,091	11,307	12,087
Suffield	Suburban	6,779	8,634	9,294	11,427	13,552	15,735
Tolland	Suburban	2,950	7,857	9,694	11,001	13,146	15,052
Vernon	Urban	16,961	27,237	27,974	29,841	28,063	29,179
Wallingford	Urban	29,920	35,714	37,274	40,822	43,026	45,135
West Hartford	Urban	62,382	68,031	61,301	60,110	63,589	63,268
West Haven	Urban	43,002	52,851	53,184	54,021	52,360	55,564
Westbrook	Suburban	2,399	3,820	5,216	5,414	6,292	6,938
Wethersfield	Urban	20,561	26,662	26,013	25,651	26,271	26,668
Willington	Suburban	2,005	3,755	4,694	5,979	5,959	6,041
Windsor	Suburban	19,467	22,502	25,204	27,817	28,237	29,044
Windsor Locks	Urban	11,411	15,080	12,190	12,358	12,043	12,498
Woodbridge	Suburban	7,673	7,673	7,761	7,924	8,983	8,990

Source: U.S. Census Bureau 1960 through 2010

Figure 5-1: Population Growth by Town
Classification: Central PWSMA

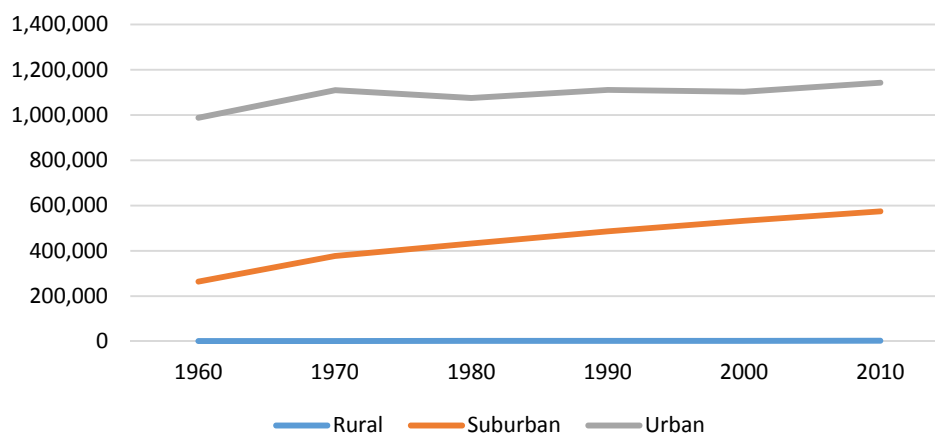


Table 4 presents future projections by town for the Central PWSMA. This data has been published by the Connecticut State Data Center (CT SDC) and interpolated where necessary (process described in the *Integrated Report*) to meet the required planning horizons. Note that actual population growth and 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 Central 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.
Andover	Suburban	3,303	3,261	3,069	2,864	2,550	2,550
Avon	Suburban	18,098	19,226	20,333	21,585	25,704	30,845
Berlin	Suburban	19,866	20,070	20,311	20,470	20,297	20,297
Bethany	Suburban	5,563	5,686	5,695	5,645	5,415	5,415
Bloomfield	Suburban	20,486	20,499	20,521	20,555	20,152	20,152
Bolton	Suburban	4,980	4,831	4,511	4,212	3,720	3,720
Branford	Urban	28,026	27,080	25,787	24,768	22,605	22,605
Canton	Suburban	10,292	10,672	10,966	11,107	11,461	11,801
Chester	Suburban	3,994	3,982	3,803	3,629	3,313	3,313
Clinton	Suburban	13,260	12,784	11,860	10,942	9,484	9,484
Columbia	Suburban	5,485	5,539	5,471	5,368	5,053	5,053
Coventry	Suburban	12,435	12,419	12,036	11,532	10,605	10,605
Cromwell	Urban	14,005	14,365	14,897	15,397	16,160	17,955
Deep River	Suburban	4,629	4,458	4,114	3,795	3,201	3,201
Durham	Suburban	7,388	7,509	7,394	7,180	6,791	6,791
East Granby	Suburban	5,148	5,252	5,325	5,341	5,306	5,306
East Haddam	Suburban	9,126	9,233	9,063	8,814	8,165	8,165
East Hampton	Suburban	12,959	13,403	13,546	13,049	11,543	11,543
East Hartford	Urban	51,252	52,053	54,147	56,260	58,550	63,415
East Haven	Urban	29,257	29,248	29,409	29,594	28,958	28,958

TABLE 4
Population Projections by Town for the Central 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.
East Windsor	Suburban	11,162	11,802	13,193	14,459	16,011	18,945
Ellington	Suburban	15,602	16,811	18,582	20,018	21,951	25,011
Enfield	Urban	44,654	43,779	42,779	41,980	40,015	40,015
Essex	Suburban	6,683	6,505	6,094	5,703	5,082	5,082
Farmington	Suburban	25,340	25,398	25,526	25,773	26,150	27,665
Glastonbury	Suburban	34,427	34,920	34,676	34,366	35,939	41,929
Granby	Suburban	11,282	11,333	10,690	10,074	10,051	10,051
Guilford	Suburban	22,375	22,553	22,010	21,463	21,853	24,204
Haddam	Suburban	8,346	8,681	8,825	8,782	8,630	8,630
Hamden	Urban	60,960	61,263	63,808	66,758	70,408	80,623
Hartford	Urban	124,775	124,899	127,205	128,982	126,849	126,849
Hebron	Suburban	9,686	9,660	9,239	8,484	7,889	7,889
Killingworth	Suburban	6,525	6,522	6,102	5,681	4,955	4,955
Lyme	Rural	2,406	2,499	2,607	2,697	2,742	2,742
Madison	Suburban	18,269	18,266	17,003	16,068	16,261	19,513
Manchester	Urban	58,241	60,155	64,436	68,487	73,036	81,697
Mansfield	Suburban	26,543	26,706	27,338	27,800	29,416	33,756
Marlborough	Suburban	6,404	6,357	6,113	5,749	5,217	5,217
Meriden	Urban	60,868	61,835	63,567	65,180	66,146	66,366
Middlefield	Suburban	4,425	4,446	4,417	4,395	4,333	4,333
Middletown	Urban	47,648	48,319	51,105	54,018	57,666	66,644
Milford	Urban	52,759	51,958	50,534	49,331	46,897	46,897
New Britain	Urban	73,206	73,733	76,367	78,909	80,989	83,832
New Haven	Urban	129,779	131,871	137,305	141,795	143,914	143,914
Newington	Urban	30,562	30,804	31,603	32,578	34,158	39,102
North Branford	Suburban	14,407	14,182	13,512	12,858	11,855	11,855
North Haven	Suburban	24,093	24,020	23,691	23,433	23,245	23,245
Old Lyme	Suburban	7,603	7,437	6,998	6,621	6,040	6,040
Old Saybrook	Suburban	10,242	9,789	8,883	8,123	6,987	6,987
Orange	Suburban	13,956	13,844	13,746	13,682	14,075	15,781
Plainville	Urban	17,716	17,689	17,738	17,845	17,652	17,652
Portland	Suburban	9,508	9,695	9,833	9,965	10,145	10,553
Rocky Hill	Urban	19,709	20,450	21,839	23,143	24,926	28,832
Simsbury	Suburban	23,511	23,321	22,217	21,874	23,574	28,289
Somers	Suburban	11,444	11,665	11,661	11,543	11,330	11,330
South Windsor	Suburban	25,709	25,459	24,614	24,018	23,389	23,389
Southington	Urban	43,069	43,597	43,602	43,160	42,639	42,639
Stafford	Suburban	12,087	12,130	12,108	11,968	11,496	11,496
Suffield	Suburban	15,735	16,199	16,721	17,002	17,458	17,527
Tolland	Suburban	15,052	15,244	14,548	13,409	12,295	12,295
Vernon	Urban	29,179	29,485	30,372	31,117	31,375	31,375
Wallingford	Urban	45,135	45,068	44,972	44,988	44,313	44,313
West Hartford	Urban	63,268	64,301	66,196	68,342	72,685	86,103
West Haven	Urban	55,564	56,224	60,368	65,144	73,508	88,210
Westbrook	Suburban	6,938	7,048	7,072	7,059	6,911	6,911

TABLE 4
Population Projections by Town for the Central 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.
Wethersfield	Urban	26,668	26,690	27,082	27,741	29,129	34,338
Willington	Suburban	6,041	6,397	6,467	6,450	5,937	5,937
Windsor	Suburban	29,044	28,721	28,399	28,225	27,498	27,498
Windsor Locks	Urban	12,498	12,487	12,618	12,766	12,633	12,633
Woodbridge	Suburban	8,990	8,654	8,015	7,497	6,599	6,599
Totals	All	1,719,645	1,732,441	1,756,653	1,779,610	1,803,285	1,918,862
	Rural	2,406	2,499	2,607	2,697	2,742	2,742
	Suburban	574,348	578,569	572,621	565,197	562,087	597,909
	Urban	1,142,891	1,151,373	1,181,425	1,211,716	1,238,456	1,318,212

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

Notes: See Appendix C for interpolation and extrapolation of CT SDC projections.

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 includes small satellite systems within the outer ESA boundary of each ESA holder. For example, CWC systems in Marlborough are included within the data for the Town of Marlborough's 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 already interconnected with other water systems or is located proximal to other water systems such that interconnections are viable, 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 maximum month average day demand (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 projected deficits indicate that new supplies will 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 5: Existing and Projected ADD, Available Water, and Margin of Safety for Exclusive Service Areas in Central PWSMA by ESA Holder (mgd)

ESA Holder	Current Supply and Demand Within Outer ESA Boundary (2015-2016)											Projected Supply and Demand Within Outer ESA Boundary (2023)										
	Residential Service Population	Residential Demand	Non-Residential Demand	Unaccounted-for Water	Water Sold to Other Systems	System ADD	Available Water	Margin of Safety	Potential Regionally Significant	Potential Available Water	Margin of Safety	Residential Service Population	Residential Demand	Non-Residential Demand	Unaccounted-for Water	Water Sold to Other Systems	System ADD	Available Water	Margin of Safety	Potential Regionally Significant Supplies	Potential Available Water	Margin of Safety
Avon Water Company	12,025	1.019	0.618	0.075	0.057	1.655	4.127	2.49	-	4.127	2.49	12,622	1.049	0.516	0.166	0.057	1.674	4.127	2.47	-	4.127	2.47
Aquarion Water Company	18,425	1.487	0.502	0.465	-	2.455	5.727	2.33	-	5.727	2.33	18,552	1.733	0.678	0.398	-	2.809	5.727	2.04	-	5.727	2.04
Berlin Water Control Commission	7,010	0.481	0.410	0.154	0.218	0.827	1.671	2.02	-	1.671	2.02	7,493	0.483	0.575	0.152	0.353	0.857	1.671	1.95	-	1.671	1.95
Cromwell Fire District	14,347	1.054	0.578	0.159	0.076	1.716	7.570	4.41	-	7.570	4.41	15,432	1.093	0.532	0.162	0.076	1.710	7.570	4.43	-	7.570	4.43
Connecticut Water Company	178,081	11.942	4.899	3.068	0.040	19.869	34.284	1.73	-	34.284	1.73	185,240	12.394	5.039	2.744	0.040	20.136	34.184	1.70	-	34.184	1.70
East Hampton WPCA	2,746	0.118	0.052	0.002	-	0.173	0.417	2.41	-	0.417	2.41	2,777	0.121	0.053	0.002	-	0.176	0.417	2.37	-	0.417	2.37
ESA Unassigned	-	-	0.008	-	-	0.008	-	-	-	-	-	-	-	0.008	-	-	0.008	-	-	-	-	-
Hazardville Water Company	18,662	1.161	0.219	0.165	0.002	1.544	4.495	2.91	-	4.495	2.91	18,662	1.161	0.219	0.165	0.002	1.544	4.495	2.91	-	4.495	2.91
Kensington Fire District	7,553	0.529	0.184	0.097	-	0.810	0.810	1.00	-	0.810	1.00	7,762	0.567	0.243	0.110	-	0.920	0.920	1.00	-	0.920	1.00
Manchester Water Department	54,849	3.607	0.572	0.790	0.005	4.963	9.222	1.86	-	9.222	1.86	58,609	3.864	1.165	0.863	0.005	5.888	9.222	1.57	-	9.222	1.57
Metropolitan District Commission	391,732	25.738	15.430	10.555	1.698	50.025	69.452	1.39	-	69.452	1.39	415,408	32.649	16.035	6.997	1.698	53.982	69.452	1.29	-	69.452	1.29
Meriden Water Division	59,409	3.267	0.845	0.964	0.002	5.074	6.110	1.20	-	6.110	1.20	61,057	4.065	1.117	1.284	0.002	6.464	6.110	0.95	-	6.110	0.95
Middletown Water Department	43,387	2.777	0.505	0.396	-	3.677	7.034	1.91	-	7.034	1.91	45,796	2.957	0.891	0.633	-	4.481	7.034	1.57	-	7.034	1.57
New Britain Water Department	73,534	5.368	3.703	0.379	1.727	7.723	15.330	1.98	-	15.330	1.98	75,441	5.658	4.087	1.158	1.837	9.066	15.220	1.68	-	15.220	1.68
Portland Water Department	4,384	0.469	0.139	0.070	-	0.679	1.500	2.21	-	1.500	2.21	4,445	0.474	0.140	0.149	-	0.762	1.500	1.97	-	1.500	1.97
SCCRWA	382,674	19.909	14.559	4.249	0.116	38.601	68.241	1.77	-	68.241	1.77	404,719	21.110	14.292	3.904	0.116	39.190	68.241	1.74	-	68.241	1.74
Southington Water Department	43,547	2.615	0.793	0.459	-	3.867	7.050	1.82	-	7.050	1.82	45,260	2.745	0.988	0.477	-	4.210	7.050	1.67	-	7.050	1.67
State Agency Existing Service Area	13,515	0.487	0.856	-	0.150	1.193	3.673	3.08	-	3.673	3.08	13,515	0.487	0.954	0.060	-	1.501	3.673	2.45	-	3.673	2.45
Tolland Water Department	2,864	0.125	0.059	0.028	0.012	0.201	0.493	2.46	-	0.493	2.46	2,971	0.190	0.051	0.014	0.012	0.244	0.493	2.02	-	0.493	2.02
Town of Bolton	-	-	0.017	-	-	0.017	-	-	-	-	-	-	-	0.017	-	-	0.017	-	-	-	-	-
Town of Coventry	-	-	0.036	-	-	0.036	-	-	-	-	-	-	-	0.036	-	-	0.036	-	-	-	-	-
Town of Durham	330	0.025	0.046	-	-	0.071	0.420	5.91	-	0.420	5.91	330	0.025	0.046	-	-	0.071	0.420	5.91	-	0.420	5.91
Town of East Haddam	332	0.024	0.038	-	-	0.062	0.116	1.87	-	0.116	1.87	332	0.024	0.038	-	-	0.062	0.116	1.87	-	0.116	1.87
Town of Lyme	-	-	0.004	-	-	0.004	-	-	-	-	-	-	-	0.004	-	-	0.004	-	-	-	-	-
Town of Marlborough	1,044	0.055	0.022	0.013	-	0.090	0.193	2.16	-	0.193	2.16	1,044	0.055	0.022	0.013	-	0.090	0.193	2.16	-	0.193	2.16
Town of Middlefield	327	0.026	0.059	0.003	-	0.088	0.170	1.93	-	0.170	1.93	327	0.026	0.059	0.005	-	0.089	0.170	1.90	-	0.170	1.90
Valley Water Systerms	16,376	0.983	0.433	0.095	-	1.511	3.770	2.50	-	3.770	2.50	18,069	1.084	0.258	0.117	-	1.458	3.770	2.59	-	3.770	2.59
Wallingford Water Division	39,064	2.012	1.451	0.478	-	3.941	9.079	2.30	-	9.079	2.30	40,786	2.001	1.901	0.571	-	4.472	9.079	2.03	-	9.079	2.03
Windham Water Works	2,505	0.126	0.056	0.026	-	0.208	4.119	19.81	-	4.119	19.81	2,939	0.158	0.130	0.043	-	0.331	4.119	12.44	-	4.119	12.44
Worthington Fire District	2,898	0.174	0.040	0.004	-	0.218	0.685	3.14	-	0.685	3.14	2,990	0.209	0.085	0.059	-	0.353	0.685	1.94	-	0.685	1.94
TOTAL FOR REGION	1,391,620	85.578	47.134	22.694	4.102	151.304	265.757	1.76	-	265.757	1.76	1,462,578	96.383	50.178	20.244	4.197	162.607	265.657	1.63	-	265.657	1.63

ESA Holder	Projected Supply and Demand Within Outer ESA Boundary (2030)											Projected Supply and Demand Within Outer ESA Boundary (2060)										
	Residential Service Population	Residential Demand	Non-Residential Demand	Unaccounted-for Water	Water Sold to Other Systems	System ADD	Available Water	Margin of Safety	Potential Regionally Significant	Potential Available Water	Margin of Safety	Residential Service Population	Residential Demand	Non-Residential Demand	Unaccounted-for Water	Water Sold to Other Systems	System ADD	Available Water	Margin of Safety	Potential Regionally Significant Supplies	Potential Available Water	Margin of Safety
Avon Water Company	13,216	1.098	0.525	0.173	0.057	1.739	4.127	2.37	-	4.127	2.37	18,492	1.523	0.570	0.211	0.057	2.247	4.127	1.84	-	4.127	1.84
Aquarion Water Company	18,928	1.773	0.688	0.408	-	2.869	5.727	2.00	-	5.727	2.00	19,964	1.873	0.730	0.428	-	3.031	5.727	1.89	-	5.727	1.89
Berlin Water Control Commission	7,748	0.497	0.470	0.108	0.218	0.857	1.671	1.95	-	1.671	1.95	9,138	0.622	0.656	0.143	0.218	1.203	1.671	1.39	-	1.671	1.39
Cromwell Fire District	16,333	1.238	0.671	0.166	0.076	1.998	7.570	3.79	-	7.570	3.79	18,945	1.409	0.901	0.193	0.076	2.426	7.570	3.12	-	7.570	3.12
Connecticut Water Company	191,943	12.862	5.128	2.358	0.040	20.307	34.184	1.68	-	34.184	1.68	218,291	14.354	5.464	1.969	0.040	21.747	34.184	1.57	-	34.184	1.57
East Hampton WPCA	11,733	0.854	0.151	0.096	-	1.100	1.078	0.98	-	1.078	0.98	13,505	1.017	0.201	0.119	-	1.337	1.078	0.81	-	1.078	0.81
ESA Unassigned	-	-	0.008	-	-	0.008	-	-	-	-	-	-	-	0.008	-	-	0.008	-	-	-	-	-
Hazardville Water Company	18,662	1.161	0.219	0.165	0.002	1.544	4.495	2.91	-	4.495	2.91	18,662	1.164	0.219	0.165	0.002	1.547	4.495	2.91	-	4.495	2.91
Kensington Fire District	7,965	0.584	0.270	0.116	-	0.970	0.970	1.00	-	0.970	1.00	9,640	0.703	0.326	0.140	-	1.169	0.970	0.83	-	0.970	0.83
Manchester Water Department	62,871	4.147	1.328	0.942	0.005	6.412	9.222	1.44	-	9.222	1.44	63,587	4.193	1.332	0.951	0.005	6.472	9.222	1.43	-	9.222	1.43
Metropolitan District Commission	432,170	33.938	16.585	6.997	1.698	55.821	69.452	1.24	-	69.452	1.24	474,647	37.252	17.299	6.997	1.698	59.850	69.452	1.16	-	69.452	1.16
Meriden Water Division	64,396	4.255	1.148	0.945	0.002	6.347	6.110	0.96	-	6.110	0.96	69,196	4.579	1.207	1.012	0.002	6.797	6.110	0.90	-	6.110	0.90
Middletown Water Department	45,796	2.957	1.031	0.657	-	4.645	7.034	1.51	-	7.034	1.51	49,352	3.224	1.045	0.657	-	4.926	7.034	1.43	-	7.034	1.43
New Britain Water Department	82,241	6.168	4.337	0.558	1.887	9.176	15.170	1.65	-	15.170	1.65	89,441	6.708	4.626	0.199	2.086	9.447	15.170	1.61	-	15.170	1.61
Portland Water Department	4,745	0.494	0.155	0.158	-	0.806	1.500	1.86	-	1.500	1.86	5,245	0.564	0.175	0.180	-	0.919	1.500	1.63	-	1.500	1.63
SCCRWA	421,557	22.067	12.443	3.775	0.116	38.169	68.241	1.79	-	68.241	1.79	470,414	24.690	12.555	4.005	0.116	41.135	68.241	1.66	-	68.241	1.66
Southington Water Department	46,275	2.832	1.056	0.516	-	4.405	7.050	1.60	-	7.050	1.60	53,183	3.368	1.837	0.456	-	5.660	7.050	1.25	-	7.050	1.25
State Agency Existing Service Area	13,515	0.487	1.177	0.072	-	1.736	3.673	2.12	-	3.673	2.12	13,515	0.487	1.547	0.091	-	2.125	3.673	1.73	-	3.673	1.73
Tolland Water Department	3,233	0.209	0.084	0.021	0.012	0.302	0.493	1.63	-	0.493	1.63	4,428	0.292	0.079	0.030	0.012	0.389	0.493	1.27	-	0.493	1.27
Town of Bolton	-	-	0.017	-	-	0.017	-	-	-	-	-	-	-	0.017	-	-	0.017	-	-	-	-	-
Town of Coventry	-	-	0.036	-	-	0.036	-	-	-	-	-	-	-	0.036	-	-	0.036	-	-	-	-	-
Town of Durham	330	0.025	0.046	-	-	0.071	0.420	5.91	-	0.420	5.91	330	0.025	0.046	-	-	0.071	0.420	5.91	-	0.420	5.91
Town of East Haddam	332	0.024	0.038	-	-	0.062	0.116	1.87	-	0.116	1.87	332	0.024	0.038	-	-	0.062	0.116	1.87	-	0.116	1.87
Town of Lyme	-	-	0.004	-	-	0.004	-	-	-	-	-	-	-	0.004	-	-	0.004	-	-	-	-	-
Town of Marlborough	1,044	0.055	0.022	0.013	-	0.090	0.193	2.16	-	0.193	2.16	1,044	0.055	0.022	0.013	-	0.090	0.193	2.16	-	0.193	2.16
Town of Middlefield	327	0.026	0.059	0.005	-	0.089	0.170	1.90	-	0.170	1.90	327	0.026	0.059	0.005	-	0.089	0.170	1.90	-	0.170	1.90
Valley Water Systems	18,518	1.037	0.219	0.109	-	1.365	3.770	2.76	-	3.770	2.76	17,966	0.898	0.215	0.097	-	1.210	3.770	3.11	-	3.770	3.11
Wallingford Water Division	41,711	2.092	2.139	0.585	-	4.815	9.079	1.89	-	9.079	1.89	37,219	2.092	2.174	0.653	-	4.918	9.079	1.85	-	9.079	1.85
Windham Water Works	2,939	0.158	0.130	0.043	-	0.331	4.119	12.44	-	4.119	12.44	2,939	0.158	0.130	0.043	-	0.331	4.119	12.44	-	4.119	12.44
Worthington Fire District	3,068	0.215	0.097	0.047	-	0.359	0.685	1.91	-	0.685	1.91	3,713	0.260	0.097	0.054	-	0.410	0.685	1.67	-	0.685	1.67
TOTAL FOR REGION	1,531,596	101.253	50.279	19.031	4.113	166.450	266.318	1.60	-	266.318	1.60	1,683,515	111.559	53.615	18.810	4.311	179.673	266.318	1.48	-	266.318	1.48

Table 6: Summary of Available Water Deficits 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 - Birchwood Estates	0.019	0.019	0.019	0.009	0.009	0.009	0.009	0.009	0.009
Cedar Ridge Apartments	0.010	0.010	0.010	0.009	0.008	0.006	0.009	0.008	0.006
CTWC - Northern Reg-Stafford System	-	0.096	-	-	-	-	-	-	-
CTWC - Shoreline Region-Sound View	-	-	0.031	-	-	0.031	-	-	0.031
CTWC - Unionville System	0.587	0.749	1.283	0.532	0.577	0.953	-	-	0.607
East Hampton WPCA - Village Center	-	0.445	0.800	-	0.359	0.629	-	0.359	0.629
Metropolitan District Commission	-	-	15.529	-	-	-	-	-	-
Southington Water Department	-	-	2.664	-	-	1.761	-	-	1.476
Tolland Water Department	-	0.051	0.181	-	-	0.133	-	-	0.133
Woodhaven Apartments	0.014	0.014	0.014	0.013	0.010	0.007	0.013	0.010	0.007
TOTAL	0.631	1.386	20.532	0.563	0.962	3.530	0.031	0.385	2.898

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



6.0 POTENTIAL INTERCONNECTIONS, JOINT USE FACILITIES, AND SATELLITE MANAGEMENT

In the Central 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:

- From Avon Water Company and MDC: CWC - Collinsville;
- From Berlin Water Control Commission: Worthington Fire District;
- From CWC-Western: Hazardville Water Company – Rye Hill;
- From Manchester Water Department: CWC-Reservoir Heights;
- From MDC: CWC-Chimney Hill;
- From New Britain Water Department: Kensington Fire District; and
- From Tolland Water Department: CWC-Riversedge.

In particular, the New Britain Water Department and Kensington Fire District systems 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 SCCRWA to CWC-Guilford) or for emergency purposes.

While it is recognized that many of the projected deficits in the region are within interconnected systems or systems for which development of interconnections appears viable, existing supplies within the regionally interconnected system are limited. Collaboration between utilities to develop new supply sources (e.g. to meet projected demands in the proposed East Hampton WPCA municipal water 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 region 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 *Intra-Regional 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 non-emergency use of the interconnections for planned maintenance events.

Given the forecast water supply deficit in the region, there is 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 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 Holders

ESA Holder	Intend to Operate Their Own Satellite Public Water Systems	Potential Need for Contract Operation by Others	Available to Operate Satellite Water Systems for Others	Satellite Systems Unlikely to Occur in ESA
Avon Water Company	X			
Aquarion Water Company	X		X	
Berlin Water Control Commission	X		X	
Cromwell Fire District				X
Connecticut Water Company	X		X	
East Hampton WPCA		X^		
ESA Unassigned	X			
Hazardville Water Company	X		X	
Kensington Fire District				X
Manchester Water Department				X
Metropolitan District Commission				X
Meriden Water Division				X
Middletown Water Department				X
New Britain Water Department				X
Portland Water Department		X		
South Central CT Regional Water Authority	X*			
Southington Water Department				X
State Agency Existing Service Area				X
Tolland Water Department		X^		
Town of Bolton		X		
Town of Coventry		X		
Town of Durham		X^		

TABLE 7
Satellite Management Needs and Opportunities of ESA Holders

ESA Holder	Intend to Operate Their Own Satellite Public Water Systems	Potential Need for Contract Operation by Others	Available to Operate Satellite Water Systems for Others	Satellite Systems Unlikely to Occur in ESA
Town of East Haddam		X^		
Town of Lyme		X		
Town of Marlborough		X		
Town of Middlefield		X		
Valley Water Systems				X
Wallingford Water Division				X
Windham Water Works		X*		
Worthington Fire District				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, non-residential, irrigation, unaccounted-for water, and other unnecessary water usage;
- Develop active and/or emergency interconnections between 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 includes meeting projected demands in the proposed East Hampton WPCA municipal water system and meeting shoreline demands in Old Lyme:

- CWC-Guilford: Develop wellfields along Hammonasset River;
- MDC (with East Hampton WPCA): Develop South Glastonbury wellfield;
- Portland Water Department (with East Hampton WPCA): Develop Strongs Avenue wellfield or construct treatment facility for Portland Reservoir;

The majority of these activities have not sufficiently advanced to having detailed cost estimates suitable for comparison of potential projects on a regional scale, or the cost estimates are relatively out of date.

Therefore, prioritization of potential projects by cost and potential yield will be pursued by the WUCC over the next five to ten years.



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.

A summary of this evaluation is provided below:

- Water Quality: All of the potential surface supply sources will draw on water which has a surface water quality of Class AA or Class A, and all of the proposed groundwater sources lie in areas mapped as GA, indicating suitability for use as a public water supply.
- Minimum Streamflow: Minimum streamflows are not expected to be impacted by withdrawals from the Connecticut River aquifer, as the proposed withdrawal rates combined are less than 1% of the 7Q10 discharge in the river. Reactivation of Portland Reservoir will require compliance with the Streamflow Standards and Regulations, so downstream flow impacts are expected to be minimal. The potential withdrawals from the Hammonasset River aquifer are significant compared to the 99% duration flow and therefore the well(s) may only be available for use during winter, spring, and other high water periods.
- Flood Management: Some activities, particularly the creation of new wellfields would need to occur in accordance with local floodplain ordinances and state regulations. A hydraulic analysis will be required for local permitting along the Hammonasset River (and perhaps the Connecticut River, depending on the limit of tidal influence) to demonstrate that any modification of the floodplain will not impact other structures.
- Recreation: Potential recreational impact along the Connecticut River is expected to be minimal as instream flow impacts are minimal and the Connecticut River is considered “not supporting” for recreation and fish consumption. Reactivation of the Portland Reservoir would require stricter controls on recreation in the Meshomasic State Forest immediately adjacent to the reservoir in order to prevent swimming and fishing by wading. The overall impact would likely be low. The potential for recreational impacts along the Hammonasset River are more significant given its use for recreational fishing, paddling, and hiking.
- Hydropower: None of the streams downstream from any of the proposed actions are used for hydropower.

- Natural Diversity Database: Each of the proposed actions lie in areas mapped by the NDDB. The potential to impact listed species would need to be evaluated in more detail as projects are considered.
- Aquatic Habitat Concerns: The occurrence of aquatic habitat impacts would be directly related to proposed withdrawal rates. The impact to aquatic habitat downstream of Portland Reservoir would be minimal, as instream flow would be maintained by compliance with the Streamflow Standards and Regulations. Aquatic habitat appears limited in the vicinity of the Connecticut River wellfield, and DEEP notes that the Hammonasset River is considered to be “fully supporting” of aquatic life. Instream flow studies or other assessments, such as a Rapid Bioassessment of invertebrates, may be necessary to determine potential downstream impacts.
- Riparian Rights: Other water users likely exist along most of the streams and brooks envisioned for public water supply use. Some utilize stream and pond access from private properties, while others may have agricultural operations or other withdrawals. These would need to be investigated in more detail as projects move forward.
- Waste Load Allocation: With the exception of the Connecticut River, the potential actions lie on watercourses not utilized for treatment of wastewater. Given the minimal instream flow reduction associated with activation of wellfields in the Connecticut River aquifer, impacts to wasteload allocation are not anticipated.
- Climate Change: The majority of potential actions are relatively resilient to climate change. The Connecticut River wellfields would be relatively resistant to the effects of climate change and droughts because the watershed size upstream of the proposed wellfields is very large. The size of the drainage basin and the many contributing tributaries will tend to mitigate for flashy droughts which may occur more frequently in the future. This is also true for the Hammonasset River wellfields to a lesser extent. Both wellfields will need to consider the potential for increased flood heights in the future. Development of surface water sources with significant storage (e.g. Portland Reservoir) is also considered to be a relatively resilient project, as the storage will offset some of the potential losses due to evapotranspiration and the effects of climate change can be evaluated over time using the safe yield methodology.



APPENDED FIGURE

Legend

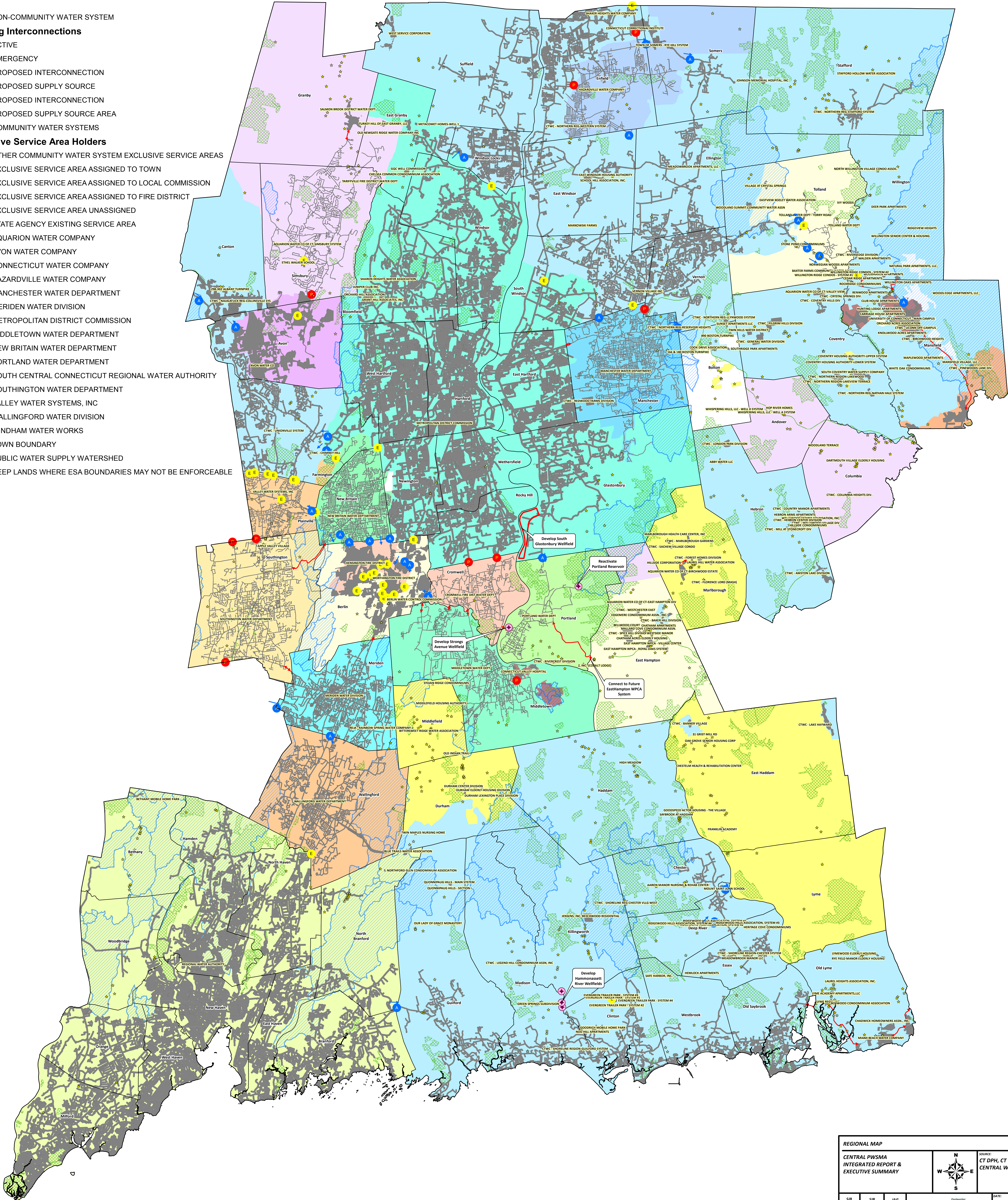
★ NON-COMMUNITY WATER SYSTEM

Existing Interconnections

- ACTIVE
- EMERGENCY
- PROPOSED INTERCONNECTION
- PROPOSED SUPPLY SOURCE
- PROPOSED INTERCONNECTION
- PROPOSED SUPPLY SOURCE AREA
- COMMUNITY WATER SYSTEMS

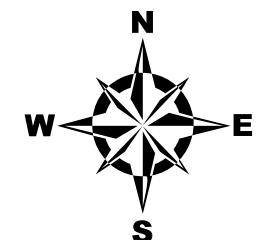
Exclusive Service Area Holders

- OTHER COMMUNITY WATER SYSTEM EXCLUSIVE SERVICE AREAS
- EXCLUSIVE SERVICE AREA ASSIGNED TO TOWN
- EXCLUSIVE SERVICE AREA ASSIGNED TO LOCAL COMMISSION
- EXCLUSIVE SERVICE AREA ASSIGNED TO FIRE DISTRICT
- EXCLUSIVE SERVICE AREA UNASSIGNED
- STATE AGENCY EXISTING SERVICE AREA
- AQUARIAN WATER COMPANY
- AVON WATER COMPANY
- CONNECTICUT WATER COMPANY
- HAZARDVILLE WATER COMPANY
- MANCHESTER WATER DEPARTMENT
- MERIDEN WATER DIVISION
- METROPOLITAN DISTRICT COMMISSION
- MIDDLETOWN WATER DEPARTMENT
- NEW BRITAIN WATER DEPARTMENT
- PORTLAND WATER DEPARTMENT
- SOUTH CENTRAL CONNECTICUT REGIONAL WATER AUTHORITY
- SOUTHTOWN WATER DEPARTMENT
- VALLEY WATER SYSTEMS, INC
- WALLINGFORD WATER DIVISION
- WINDHAM WATER WORKS
- TOWN BOUNDARY
- ▨ PUBLIC WATER SUPPLY WATERSHED
- ▨ DEEP LANDS WHERE ESA BOUNDARIES MAY NOT BE ENFORCEABLE



REGIONAL MAP

CENTRAL PWSMA
INTEGRATED REPORT &
EXECUTIVE SUMMARY



SOURCE:
CT DPH, CT DEEP,
CENTRAL WUCC

SIB
DESIGNED

SIB
DRAWN

JAG
CHECKED

SCALE:
1:96,000

PROJECT NO.:
1017-05-05

Engineering
Landmark Architecture
and Environmental Science

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DATE:
MARCH 2, 2018

SHEET:
APPENDED
FIGURE 1



APPENDIX A

PUBLIC COMMENTS RECEIVED ON THE PRELIMINARY EXECUTIVE SUMMARY



APPENDIX B

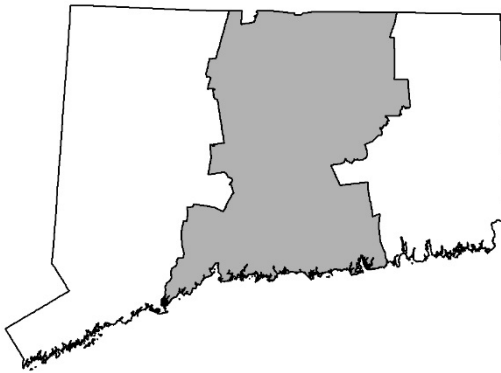
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Coordinated Water System Plan

Part I: Final Water Supply Assessment

Central Connecticut Public Water Supply Management Area

December 12, 2016



Prepared for:

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&q=576506](http://www.ct.gov/dph/cwp/view.asp?a=3139&q=576506)

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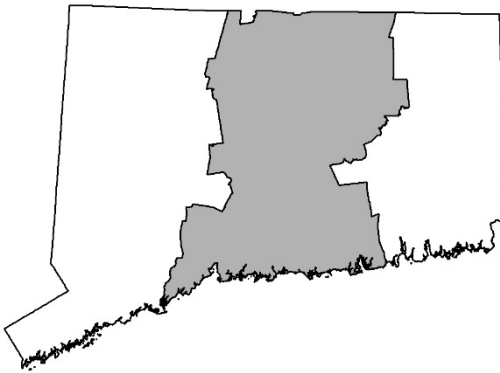
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Coordinated Water System Plan Part II: Final Recommended Exclusive Service Area Boundaries

**Central Public Water Supply Management Area
June 14, 2017**



Prepared for:

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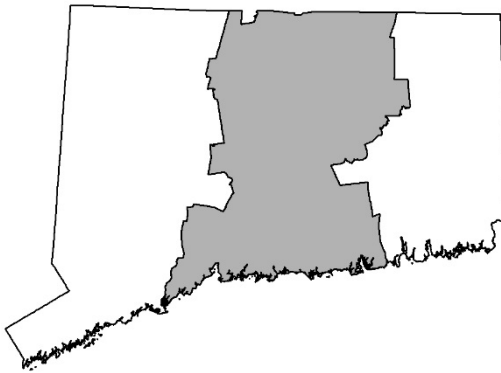
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Coordinated Water System Plan

Part III: Preliminary Integrated Report

Central Connecticut Public Water Supply Management Area

March 15, 2018



Prepared for:

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