

Task 1B-4 White Paper – Revised DRAFT JAN 2017

Future Water Management Challenges

The purpose of this paper is to identify and describe some of the conditions within the State of Connecticut that will likely pose challenges to meeting the objectives of the State Water Plan with the available water management options and opportunities described in White Paper 1B-3 (“Water Management Alternatives”). Paper 1B-3 is intended as a precursor to this paper – the two should be considered as companion documents, and 1B-3 should be read first. In “Water Management Alternatives,” specific opportunities to achieve the goals of the State Water Plan are identified and described in the form of alternative water management strategies and practices for the future, that will be addressed within the Plan.

Nothing in this paper is intended to recommend or critique certain decisions or existing conditions, nor elevate the significance of any particular future challenge above the others. Instead, the paper is offered as an objective examination of the factors in Connecticut’s natural environment and regulatory framework that will influence water management recommendations in Phase II of the Plan Development Process. Many of the challenges result from decisions that were made for the benefit of Connecticut’s citizens and environment, but this does not exempt the decisions from challenging consequences that sometimes accompany the benefits.

Some of the challenges are faced by any state that undertakes a statewide planning process, some are shared by other New England states, and some are unique to Connecticut. Likewise, some challenges will be universally evident across the state because they originate in the state’s regulatory framework and structure, and are likely to affect any future decision or recommendation, while others may affect only certain regions or water uses. It is important to understand this difference, because different challenges must be met with appropriate breadth of responses when implementing the plan.

It is also important to note that while many of the circumstances presented in this paper are likely to present challenges to water management in the future, many have been established for good reasons and with long histories of benefits to Connecticut’s citizens and environment. This paper is not a critique of the future challenges, but an effort to broaden awareness of both the benefits and the potential hardships associated with current and past conditions. With this framework as its basis, the paper addresses the following future challenges to the implementation of water management opportunities (**see Table 1**):

Table 1: Future Water Management Challenges

Overarching Challenges Inherent in the Connecticut Regulatory Framework* (Section 1 of this Paper)	Challenges Unique to Certain Water Uses or Sectors* (Section 2 of this Paper)
Connecticut's Established Home Rule	Water Allocation (registered diversions, small unreported uses, etc.)
Levels of Authority during Plan Implementation	Adoption of Instream Flow Requirements as an Ecological Water use
Connecticut's Prohibition of Class B waters for human consumption	Public Water Supply Issues (Coordination with WUCC process, Barriers to regionalizing small supplies, changes in future consumption)
Public Perception and Uncertainty (including lack of a "conservation ethic" in Connecticut)	Watershed and Aquifer Protection Where Incentives are Lacking
Funding Constraints	Water System Vulnerabilities and Security Issues
Data Gaps	The Food-Energy-Water Nexus
Understanding Economic Impacts	Emerging Contaminants
	Aging Infrastructure
	Funding for Water Reclamation
	Constraints on Water and Sewer System Expansion

**The Challenges are not presented in any specific order of importance, and the paper explains that many of these challenges also have beneficial histories that will extend into the future for the benefit of Connecticut's citizens and environment.*

1. Overarching Challenges Inherent in Connecticut's Regulatory Framework

This section will examine certain challenges that will likely affect future water management because of the state's existing regulatory structure. Though they may pose challenges, these conditions are also in place for many reasons, and have yielded many benefits to Connecticut citizens and their way of life. Just as traffic laws are imposed to protect the public good, so too do they represent constraints on human activities that can, at times, be challenging. The characterization of the regulatory conditions, likewise, that may pose "challenges" in no way implies that they are to be altered or adjusted, but rather, that they should be understood and acknowledged in order to make informed decisions about water management.

1.1 Challenges Associated with "Home Rule"

A central tenet of life in Connecticut is the principle of "home rule," or a high level of management authority at the municipal level. Connecticut is divided into 169 municipalities¹ that administer their own land use regulations within the parameters of state statutes. All are required to develop a local Plan of Conservation and Development as described in the 1B-2 paper. Some municipalities share services such as education (through regional boards of education) and health (through local health districts), but "home rule" is ubiquitous throughout the State's

¹ Although the figure of 169 is often cited, the number is higher when separate municipal jurisdictions are included (Town and City of Groton, Town and Borough of Stonington, Town of Griswold and Borough of Jewett City, Noank, Groton Long Point, Fenwick, etc.).

municipalities. In some cases, water is managed regionally (examples can be found in the 1B-2 paper) but in the future, there are no clear guidelines or incentives for regionalization.

To be clear, these differences are often strengths that build community character and give people and businesses choices about where to be located. However, some of the longest-running water challenges in the State could not be solved without municipalities working together, such as the regional interconnection of water utilities in southeastern Connecticut. This regional approach in southeastern Connecticut has solved water imbalances [the provision of water from Groton Utilities to Montville and the Mohegan Tribe], improved cooperation during day-to-day as well as emergency situations [the Intra-Regional Water Supply Response Plan], and fostered future collaboration relative to identifying new sources of supply [the SCCGOG subcommittee for water resources planning].

Despite the numerous benefits of local control and citizen involvement with local issues, home rule can pose certain challenges for managing water (this same governmental structure has certainly hindered regional and statewide planning in neighboring Massachusetts). Consider the following examples:

- Because municipalities are enabled by the State to form municipal water departments and water pollution control authorities, water and sanitary sewer service areas are often coincident with municipal boundaries, leading to the existence of many moderately-sized water and sewer service areas in some parts of the State.
- Many of the municipal water and sewer systems are, in turn, surrounded by towns without water or sewer service; or towns that are part of regional water and sewer authorities. This leads to vast differences in how water and wastewater is managed over the span of as little as three adjacent towns that could otherwise be competing uniformly for economic development opportunities and other amenities. Examples of adjacent towns with different water and wastewater situations include Cheshire [regional water supply and municipal sewers], Wallingford [municipal water and sewer], and Durham [limited municipal water service and no sewers]; Ridgefield [regional water supply], Danbury [municipal water and sewer], and New Fairfield [many small water systems and no sewers]; and Manchester [municipal water and sewer], Vernon [regional water supply and municipal sewers], and Bolton [several small water systems and a desire for expanded sewers].
- Potentially regional solutions to water supply and wastewater problems are not always recognized or supported by municipalities (or incentivized) as the municipalities attempt to solve problems internally.
- Different municipalities typically manage drought response differently, and a few have drought ordinances while many towns do not. This can be especially challenging when a regional water utility serves more than one town. Additionally, municipalities are the only entities with enforcement authority until emergencies are declared. Municipalities may face difficulties in managing water demand when ordinances are not in place to help govern private or irrigation wells, for example.

- Municipalities with sanitary sewer service and municipalities that are sewer avoidance towns are sometimes side-by-side, making it difficult to equitably attract businesses or provide services.
- Stormwater management ordinances usually vary from one town to the next, with vast differences in requirements for collecting, conveying, treating, detaining, retaining, and discharging stormwater. In addition, municipalities are individually responsible for dealing with MS4 general permits that can be confusing and, at the present time, changing.
- Low impact development has been embraced by some municipalities but not others.

This is not a critique of home rule, but an acknowledgment of this way of life in Connecticut, and an effort to raise awareness that it can pose interesting challenges to centralized planning and policy implementation.

1.2 Levels of Authority Going Forward

There is uncertainty in the future roles, responsibilities, and levels of authority of the Water Planning Council, and indeed of the state agencies with respect to implementing the recommendations in the Plan. Refer to Paper 1B-1 for an overview of the existing Water Management Framework in Connecticut. One of the objectives of the State Water Plan is to develop an implementable plan with an effective management structure. The challenges of meeting this objective include the following:

- Authority established by current law provides sometimes overlapping oversight on water resources that results in conflicting drivers, such as protecting public health while also protecting environmental health – both necessary, but both of which rely on the same limited resources.
- Revising the roles of state agencies or encouraging cooperative decisions can sometimes be impractical or met with resistance.
- There is no current model for making large-scale consensus-based recommendations on water policy in Connecticut, and a central challenge of the Plan development process (shared by the WPC, the state agencies, the stakeholders, and the consultant) is to develop such a framework that will be influential, even persuasive, at the legislative and executive levels within the state so that future laws and regulations will carry broad support. Even defining a more consistent method of communication within the Council and its agencies could be challenging, given the ambiguous authorities for decision-making.
- The Water Planning Council will need specific roles and authority during the implementation phases of the Plan, both for the purposes of advocacy and actual follow-through with the Plan recommendations. The challenge of being limited only to give advice to the legislature may become a hindrance, as many initiatives may not actually require changes in laws or regulations, but rather take the form of incentives, partnerships, joint funding pursuits, and guidelines for local response to statewide initiatives.

1.3 Future Challenges Associated with the Prohibition of Class B Waters for Drinking

Note: This topic could fit into either category, as its challenges are inherent to Connecticut's regulatory framework, but also specifically related to drinking water. However, because so many other uses rely on water provided from utilities that treat Class A water for both potable and non-potable uses, it is included as an overarching aspect of the regulatory conditions in Connecticut, as it will affect many decisions and recommendations.

An overarching challenge facing Connecticut, or any other state, is that water for human health and water for ecological health rely upon the same resources. The fundamental goal of this State Water Plan, therefore, is to improve the balance of use when shared resources are limited. Overcoming the lack of a consistent method of accounting for the benefits and impacts of various water uses will be an important challenge to address.

As portrayed in the 1B-3 paper, Connecticut uses only Class A or Class AA surface waters for human consumption, pursuant to Section 22a-417 of the Connecticut General Statutes. Withdrawals for human consumption are not allowed from Class B surface waters (or lesser quality) as these may receive treated wastewater (some of which originates outside the State and therefore outside the State's jurisdiction) or may be adjacent to (and downstream from) Class B groundwater. For example, the Connecticut River is not used for drinking water purposes because treated wastewater is discharged into the river and it is Class B. This rule has been a mainstay in Connecticut, the only state in the United States in which this form of public health protection is the law. As a result, public water supply customers benefit from lower risk of consuming contaminants associated with water bodies more susceptible to eutrophication, industrial wastewater, and discharges of sewage effluent. In addition, it is presumed that many of the State's residents are avoiding the potential ramifications of consuming many emerging contaminants such as cyanotoxins and pharmaceuticals.

Additionally, the State's water utilities can experience lower costs for filtration and treatment of surface water compared to other States where Class B waters can be used for drinking. Additionally, treating more degraded raw water to drinking water standards could involve more energy intensive treatment processes, such as DAF and ozonation, and this could, in turn, affect air quality and climate trends.

Since water has historically been plentiful in Connecticut, the limitations on the use of Class B waters has not imposed significant stress on the state's water supply. However, the advent of future conditions, some certain and some potential, could render the Class B restriction as a challenge. For example, the new instream flow requirements (see Section 2.2) will likely render less Class A and AA water available for drinking. This not only affects water utilities, it represents a fundamental challenge as both human health interests and environmental health interests rely upon the same resources. Likewise, if registered diversions are used to their full extent in certain basins where they are currently not fully used (see Section 2.1.1), even less water could be available for other uses. Class B waters may be relied upon more heavily for non-potable uses, requiring infrastructure that is not necessarily in place today. In these ways, the restrictions on Class B waters pose some unique challenges to *future* water management:

- Headwater streams and moderately sized rivers are being relied upon for supply to many of the largest water utilities in the State such as MDC, RWA, Aquarion, Connecticut Water Company, Waterbury, New Britain, Bristol, Groton Utilities, Norwalk First Taxing District, SNEW, New London, Norwich Public Utilities, Wallingford, Manchester, Danbury, Windham Water Works, and others. Many of these streams flow into reservoirs to store water for drinking and other uses. Because of other demands on this water (instream ecological flows and potential exercising of registered withdrawal volumes), these headwater basins could see less water available for other future uses. With respect to instream ecological flows, the impacts may be limited to river reaches downstream of the supply reservoirs. Even today, the flashiness of headwater streams has led some water providers to either build reservoirs or rely upon nearby alluvial aquifers because storage can help sustain supply through drier periods.
- Because headwater streams and moderately sized rivers are being relied upon for supply to many of the largest water utilities in the State, sections of streams that are likely to become more flow-impaired are often found in the upstream reaches of river systems while some lower sections of river systems are less vulnerable to flow alterations or, generally speaking, not likely to be impaired because of many tributaries and wastewater return flows. However, in some cases, downstream river reaches are vulnerable to other pressures caused by development; impervious area, stormwater runoff, etc.
- When developing new sources of water supply, the State's water utilities have looked to groundwater supplies and interconnections rather than attempt to develop new diversions from the Class A watercourses, which are relatively smaller than Class B watercourses. This has led to a sometimes complex pattern of interconnections in the State, plus large areas of groundwater supply development along rivers and streams of various sizes. While this paper does not cast such practices either positively or negatively, they do reflect an important point: The suite of available options for future supply is limited.
- Because headwater streams and moderately sized rivers are being relied upon for supply to many of the largest water utilities in the State, vast areas of rural land are held by water utilities for protection of public water supplies and therefore protected from development. This is not likely to ease in the future, especially as additional water demands are placed on these headwater streams in the form of ecological flows and registered diversions.

It should also be noted that groundwater in Connecticut is classified based on its quality. Table 2-4 in the main section of the Interim State Water Plan Report explains these classifications, and the allowable uses of each. Future considerations of allowable groundwater usage, or matching the appropriate quality of groundwater to the end uses to preserve drinking water for drinking may be an important consideration in future water planning in Connecticut.

1.4 Public Perception and Uncertainty

Any effective water plan must conscientiously blend legislative initiatives with grass roots needs at a local level. While the project team, participating state agencies and WPC committees will collaborate in advertising opportunities for public citizens to ask questions and comment on the

plan and the planning process via public forums and decision-making workshops that are open for public viewing, the actual level of engagement is beyond the control of project participants. Certain recommendations in the Plan may meet with resistance in the legislature if constituents raise concerns about lack of involvement or inadequate understanding of the decisions and their impacts. This challenge is not unique to Connecticut, but the concept of home rule in the state can exacerbate this challenge – just over the border in Massachusetts many statewide and regional initiatives have been resisted by individual communities who press instead for the status quo in the face of uncertain future pressures or restrictions.

Additionally, one of the fundamental tenets of state water plans developed by other states in response to water scarcity is a focus on water conservation. In the Northeast U.S., water scarcity has not been a prevailing problem historically, but future changes could affect the balance of water availability and need. These changes include new climate trends, new regulations that require more water to remain in streams for environmental purposes, and changing trends in population and demographics. If water conservation is favored by project stakeholders as a viable and agreeable form of future water management, overcoming a perceived lack of an established “conservation ethic” in the state may be very challenging. Customers who are accustomed to using water as needed may be resistant to voluntary measures (incentivized or not) that are much easier to promote in states where water is broadly understood as a scarce resource. It may be that a great deal of outreach and education would need to accompany any water conservation initiatives in Connecticut.

1.5 Data or Other Resource Gaps that Limit Understanding of Water Resources and Needs

Data gaps are a key challenge in the context of water management because the lack of data (whether unavailable or inexistent) leads to uncertainties that can impede decision-making. A separate memo that explains data gaps has been prepared, and is available as a draft section of the State Water Plan Interim Report (See **Section 2.1.2.2**). The State Water Plan will need to be developed while attempting to minimize the uncertainties associated with data gaps. At the same time, the State Water Plan should set priorities for addressing and correcting data gaps.

Connecticut is somewhat unusual in that much of the data that is publically available in other states is protected for security reasons. While it may not be a significant challenge in the Plan development to not know exactly where specific water intake facilities are located, the lack of certain information on actual water consumption (either because it is protected or not reported) will be a major challenge in identifying the basins that could experience the most stress in the future, and understanding how these basins could benefit from alternative management strategies. Examples of additional data gaps include, but are not limited to, small water uses, water quality conditions, agricultural water use, etc.

1.6 Funding Sources and Constraints

Identification of funding sources will be a challenge for future water management in Connecticut. Like many states, Connecticut is facing challenges of increasing budgetary stresses with a limited tax base. This has contributed directly to loss of funding associated with projects that involve water management. For example, a town in western Connecticut was eligible for funding through

the DEEP Potable Water Program to extend water service to properties with potentially contaminated well water supplies, but received word in spring 2016 that the State Bond Commission would not be capable of funding the project. The project had many benefits aside from the provision of a safe drinking water supply; it would have allowed several non-community public water systems to be retired, and would have provided interconnections to two nearby community water systems.

The traditional methods of funding water-related projects in Connecticut (CWSRF, DWSRF, municipal bonds, water revenues, private water utility funds, etc.) will likely continue into the coming years. However, additional sources of funds will need to be identified, and it is unclear how much federal and state funding may be available in years ahead for water related initiatives. It is reasonable to assume that the State may contribute to future innovative water projects, just as the State funded the reclaimed water facility at UConn.

Many opportunities appear to be emerging for investments in “green” projects. In the coming years, the State could monitor the availability of projects that can be funded, in part, by investments in green projects.

1.7 Economic Impacts – The Challenges of Estimating Future Impacts and Benefits of Decisions

One of the challenges for future water management in Connecticut related to funding is that costs are often easily estimated but benefits are not easily estimated. Many federal funding programs (FEMA, U.S. Army Corps of Engineers) require benefit cost ratios above 1.0 before funding can be considered. While this is not directly applicable to State Revolving Fund projects, the assumptions are that project benefits are tangible. An important caveat to federal funding is that benefits are often monetized, and water management decisions cannot always be equated to impacts or benefits in the form of dollars. Understanding whether decisions will likely encourage or hinder economic development on a subjective basis is usually intuitive, but quantifying economic potential will always be a challenge, especially if economic impacts of statewide or regional decisions could affect municipalities in different ways. Complicating this further is the fact that so many benefits of water management decisions (environmental stewardship, ecological restoration, aesthetic, etc.), while interconnected with a region’s economy, are often based more solidly in human values and priorities, which cannot be monetized.

Aside from evaluating the impacts in terms of economic development potential, there is also the basic evaluation of cost and cost avoidance which factors into water management decisions. Even these can be complicated and prove to be challenging. An example taken from the public sector is the UConn reclaimed water facility. The cost of the project consisted of a fixed portion (design, construction) and currently includes the ongoing operations and maintenance. There is a cost to produce reclaimed water that can also be calculated. The benefits are clear but estimating their values is not straightforward:

- Benefits associated with pumping 500,000 gpd less, taken from the Willimantic River wells, assuming the Fenton River wells are shut down; as is, typical in many summer to fall seasons.

- Benefits associated with 0.8 cfs of water remaining in the Willimantic River (assuming that the water saved by using reclaimed water has not been repurposed).
- Benefits associated with the project potentially serving as a model for other reclaimed water facilities in the State.
- Benefits associated with freeing potable water for higher/better uses on campus.

Furthermore, it will be important for the Plan to consider how costs of future water management policies might be born, and by whom, and should be cognizant of the potential impacts to utilities, ratepayers, private well owners, etc.

It may be advisable to begin developing a process to estimate the dollar values associated with the benefits of future water management programs and projects in Connecticut. FEMA, the U.S. Army Corps of Engineers, and NRCS can all be contacted for information about how they have incorporated environmental benefits into their evaluation tools. These processes can work well for specific projects (for example, miles of stream buffer zones improved), but at a statewide policy level it is more challenging. And it will also be important to include the benefits that have more to do with public and environmental health, quality of life, and ecological restoration potential which are not easily translated into dollars.

At a smaller scale, it will also be important to understand potential economic impacts to private well owners, if in the future they need to deepen wells or install storage tanks. These may be difficult to predict and quantify at a planning stage, and this could pose a challenge for the State Water Plan.

2. Challenges Unique to Certain Water Uses or Sectors

This section focuses on specific future challenges to water management alternatives that seek to improve specific water uses (ecological needs, water supply needs, etc.) or sectors of the water environment (surface water, groundwater, or reclaimed water, for example). Unlike Section 1.0, these challenges arise less from the regulatory and legislative history in Connecticut than they do from the current balance of water supply, water quality, and all of the state's water needs. While the regulatory framework and legislative history are certainly related to the issues in this section, these discussions focus more specifically on individual water needs and the way the regulatory decisions may affect the balance between water supply and water needs, which is different than the impacts from the regulatory structure on its own.

2.1 Water Allocation

2.1.1 Registered and Permitted Diversions

The Water Diversion Policy Act of 1982 attempted to more strongly regulate withdrawals and alterations to flow by establishing a permit requirement for any consumptive or non-consumptive diversion from a water source greater than 50,000 gallons per day. However, any diversion registered by July 1, 1983 was exempt from the permitting requirements of this Act. Approximately 1,800 registrations of exempt withdrawals were recorded, which are valid in perpetuity. Many water withdrawals were registered for vastly greater amounts than they have used since that time. This has reportedly made it challenging to allocate water in Connecticut.

However, water registrations have been relied upon for many years because of the benefits they offer to water users:

- They ensure supply adequacy for many water users
- They allow water use in some places where environmental consequences may be significant, but the need for water is very great and there has been a need for balance. Most of the water supply reservoirs are registered, and they provide storage to buffer persistent dry periods.

The “Situation Assessment in Support of State Water Planning Workshop” memorandum (June 25, 2015) described some of the following challenges to registered and permitted diversions, both present and future (it also states some opinions and recommendations, which are not included here):

- Registrations have created situations that could result in over-allocation in some basins if the registered volumes are actually withdrawn.
- Registrations do not necessarily reflect actual water withdrawals. In many cases, they represent the instantaneous capacity of the intake facilities, and not a continuous average daily withdrawal. However, they could be exercised continuously at full capacity in the future even if they have not been historically.
- Registrations are still listed for defunct water users.
- The registration process lacked consistency in the methods used to determine registered amounts.
- Data on registered and permitted diversions are critical for a meaningful evaluation, and the difference between actual usage and registered/permitted usage are not always readily available.

Fundamentally, the future challenge associated with water registrations in Connecticut is that without a major reversal of state law, basins may have a perpetual surplus of unavailable (but usable) water, or recurring shortfalls if the registrations are all exercised. Even small steps in revising registered volumes downward toward more accurate reflections of actual water need may be viewed as an infringement. This is both a political and hydrologic challenge.

2.1.2 Private Sector/Industry Water Uses (i.e. power plants, manufacturing, bottled water)

One of the impacts of de-regulation of the electrical industry more than ten years ago was the development of power development facilities in the state. Some of these facilities have required water commitments from nearby public water systems for active daily supply as well as potential peaking supply, and there is often a large discrepancy between these figures. Power generation facilities are proposed or pending in Oxford (gas-fired) and Beacon Falls (fuel cell), and both will rely on nearby public water systems for non-potable uses. The 1B-3 paper discusses the potential options for supplying power generation facilities (“Use of Class B Water for Non-Potable Sources”

and “Reclaimed Water for Non-Potable Uses”). Further discussion is needed regarding how to most effectively and efficiently provide water to power generation needs.

Many of the new and emerging industries in Connecticut (specialty manufacturing, research and development, bottling plants, etc.) are selecting locations that are within or adjacent to large public water distribution systems, and could therefore be supplied by these public water systems. When this occurs, the water that will be utilized by the new customer has already been regulated pursuant to the Water Diversion Policy Act because the public water system is either registered, permitted, or both (some combination of registered and permitted sources). Customers are not further regulated by the Water Diversion Policy Act unless they are legally considered separate public water systems (typically with their own PWSID), but this type of arrangement is infrequent.

In recent years, there have been several examples of proposals that have caught the public’s attention due to the volumes of water proposed for those customers. Going forward, public water systems are obligated to serve the new customers that arise in their service area regardless of the intended use of the water supplied, and municipalities are obligated to review land use applications in their boundaries. But in any venue, new large water uses can pose challenges in river basins, especially if primary sources have historically been Class A or AA for both potable and non-potable uses. The State may benefit from guidance about how to work with communities to site and permit new large water users while considering economic development plans and needs. This connects back to the challenges associated with home rule, where municipalities are often competing for new developments.

2.1.3 Cumulative Effects of Water Withdrawals Below 50,000 gpd

Thousands of public water systems in Connecticut (small community, TNC, and NTNC systems) withdraw less than 50,000 gpd each, and are therefore not regulated under the Water Diversion Policy Act. In addition, hundreds or thousands of non-potable water users (rural commercial and industrial users, nine-hole golf courses, small nurseries and farms, and residential irrigation from streams) use less than 50,000 gpd (each) and are similarly not regulated by the Water Diversion Policy Act.

The cumulative impacts of water withdrawals that are each less than 50,000 gpd are not quantitatively known. It is suspected that cumulative impacts are less adverse in areas where water is returned via subsurface sewage disposal systems, but this may not always be the case. Likewise, sewerage areas are typically believed to be adversely affected by the export of water, but this may not always be the case either. Cumulative withdrawals have not been summed and compared to the hydrology of different drainage basins.

Future water management amidst uncertain cumulative withdrawals is complicated further by more than 300,000 private groundwater wells in the state. Private groundwater supplies are used by 23% of Connecticut’s population. Some towns rely exclusively on private groundwater wells. The unknown volumes of private groundwater used for residential or commercial consumption and irrigation can only be estimated at this time.

Hence, the unknown volumes of water withdrawals that use less than 50,000 gpd, coupled with the undocumented volumes of private well withdrawals across the state, pose a significant

challenge to understanding which basins could experience the most stress in the future, which are most vulnerable to action or lack of action, and which could most benefit from specific recommendations in the Plan. Further information can be found in the DPH report, “RECOMMENDATIONS TO THE CONNECTICUT GENERAL ASSEMBLY FOR ENSURING THE ADEQUACY AND PURITY OF NEW PRIVATE DRINKING WATER WELLS”

2.2 Instream Flow Needs

2.2.1 Situations Where Instream Flow Needs are not Considered

The Streamflow Standards and Regulations attempt to address the artificial regulation of instream flows downstream of impoundments by classifying streams and river by degree of human alteration, and subsequently requiring certain releases from impoundments. This process will result in achieving different instream flow patterns below registered diversions, with the intent of offering ecological benefits because the required releases will more closely mirror “natural” conditions. One impact of implementation may be reductions in safe yield of public water supplies that leads to a need for supply augmentation, although certain exceptions provided by drought triggers and margin of safety triggers (contained in the regulations in paragraphs (b) and (c) of Section 26-141b-6) could help mitigate this risk.

This could include a reliance upon new interconnections and interbasin transfers, or new source development. Fundamentally, the challenge is that the ecological flows represent a new, authorized demand for water that could restrict other uses downstream of impoundments. Competing water demands (consumptive and non-consumptive²) may be more prevalent in Connecticut’s future than they have been in the past.

However, the Streamflow Standards and Regulations provide for many exemptions. According to the regulations summary, the following uses are exempt from the restrictions of Sections 26-141b-1 to 26-141b-8:

- Hydropower under FERC
- Fire emergencies
- Flood control dams
- Dams not on streams
- Permitted diversions
- Diversions subject to approved flow management plans such as special act or wild and scenic designations

² The terms “consumptive” and “non-consumptive” water use can be interpreted in different ways. For the purposes of this paper and the State Water Plan, “consumptive” water use refers to water use that removes water from its natural environment (a stream, reservoir, aquifer, or other water body) while returning it elsewhere, fully or as a percentage of what was removed. “Non-consumptive” water use shall refer to water that remains in the stream for uses such as recreation, ecological health, and aesthetics.

- Tidal rivers
- Impoundments with no active manipulation or withdrawal (these are typically lakes and ponds used for recreation or other non- consumptive purposes)
- Small intermittent withdrawals
- Drawdowns for dam inspection and weed control
- Agriculture and golf courses
- Dams with watersheds less than 3 square miles or naturally limited flows
- Certain streams between reservoirs

The reasoning behind these exemptions is that the interruptions in streamflow are either temporary, or the inflow to the impoundment is similar to the outflow, or the environmental conditions have been reviewed through the diversion permit process or FERC licensing process. Therefore, these exemptions likely will not cause or allow adverse instream flow conditions to continue, in most cases. Other exemptions exist as well, such as streams whose flow is low enough that the required flow remaining in the stream by statute would be 0.1 cfs or lower.

Instream flow can be affected by groundwater withdrawals. At the basin scale, the net effect of groundwater withdrawals includes reduced discharge to streams and rivers. At a more localized scale, the effect can include reduced discharge and induced infiltration. The diversion permit process includes a review of impacts, but the registration process did not (as noted above). Therefore, there are many groundwater withdrawals in Connecticut that may be causing adverse impacts to instream flows. A previous version of the Streamflow Standards and Regulations – which was not passed – included provisions for cutting back groundwater withdrawals to protect instream flows.

Discussions about instream flows are typically dominated by concerns related to surface water and groundwater withdrawals. However, land use can also affect instream flows. Mounting evidence has demonstrated that the proliferation of impervious surfaces will make streams flashier, increasing high flows while reducing groundwater recharge to the extent that it causes reductions in base flow discharges to streams. Land cover is one of the factors in the classification of streams pursuant to the Streamflow Standards and Regulations, but it doesn't directly affect required releases. LID techniques (discussed in this paper and others) better maintain natural conditions that act to infiltrate precipitation to the groundwater system, and subsequently available for discharge to streams. It may be a challenge to change land development in Connecticut going forward, to incorporate additional LID methods that benefit instream flows, because the direct benefits are difficult to see or understand and because land development is regulated at the local level.

2.2.2 Streams on the Impaired Water List (319) that are Flow-Impaired

The Impaired Waters list (described in the 1B-1 paper) is updated periodically and typically includes identification of stream segments that are flow impaired (or believed to be flow impaired). The 2014 edition of the list notes the following:

“DEEP documents streams and rivers affected by impoundments and water diversions as they come to our attention, however DEEP has not conducted a comprehensive assessment of flow impairments. Flow alteration has been reported as an impairing cause in stream segments with known water diversions and documented dry streams, primarily by field staff during sampling events and recorded by digital photos. For example, a number of stream miles, as in the lower Farmington River and the entire Quinebaug River, are affected by extreme fluctuations in water levels resulting from hydropower generation. DEEP staff have documented flow impairments on 1.4% of river miles, but 98.6% (2,333 river miles) are currently unassessed for flow.”

Nevertheless, Table 3-7 of the 2014 report lists the watercourses that are believed to have “nonpollutant impairments.” Approximately 20 of the listed stream segments are believed to have altered flow conditions that are causing the impairment. This list may be an important consideration for the State Water Plan, because the challenge may be that future needs may not all be met by historically available sources. It is understood that the 2016 edition of the impaired waters list is forthcoming, and additional information may be available.

2.2.3 Identification of Existing Studies and Plans

Many instream flow studies have been conducted in Connecticut over the years. Notable rivers and streams that have been studied include the Willimantic River near UConn, the Fenton River near UConn, the Natchaug River downstream of the Willimantic River, the Shepaug River downstream of the Waterbury water supply reservoirs, the Farmington River downstream of the confluence of the east and west branches, the Pomperaug River, and the Quinebaug River in northeastern Connecticut. The instream flow studies for these rivers have been conducted for different reasons with perhaps varying goals, but most of them quantified the impacts of low flows on fish habitats. It would be ideal if all of the instream flow studies prepared in the State were catalogued and filed in a central location for easy access and therefore available to use when making decisions about water withdrawals and other actions that affect instream flow. The challenge is that the information is currently not centralized.

DEEP is in the process of identifying additional instream flow studies that have been conducted, including the Little River in Putnam, Pattagansett River in East Lyme, Menunketesuck River in Killingworth, and the Eight Mile River.

The existing flow management plans and compacts in the State (Willimantic River, Fenton River, Farmington River, Quinnipiac River, and others) have been relatively successful in maintaining minimum instream flows in these watercourses. The implementation of the Streamflow Standards and Regulations over the next ten years may lead to development of additional flow management plans and compacts.

2.2.4 Planning for Locations of Future Studies, Plans, and/or Compacts

The State of Connecticut appears to lack a process for promoting, funding, or otherwise instigating the completion of additional instream flow studies. Likewise, the development of streamflow management plans and compacts appears to be left up to the regulated communities at this point. A consistent approach to prioritizing instream flow studies in the State would be ideal because streams could be assessed quantitatively rather than relying on anecdotal evidence that adverse impacts are occurring. The impaired waters list could be used as a starting point for

prioritizing locations for studies. Additionally, areas downstream of impoundments could be identified for completion of instream flow studies prior to the full implementation of the Streamflow Standards and Regulations.

2.3 Public Water System Challenges

2.3.1 Coordinated with WUCC WSA reports

The three Preliminary Water Supply Assessments (WSAs) were subject to public review in autumn 2016 (one for the west region, one for the central region, and one for the east region). The three final WSAs will be approved in December 2016. Each WSA report ends with a chapter that presents issues and challenges in the region. These are the categories:

- Future Supply Sources
- Impacts of Streamflow Regulations
- Coordination of Planning
- Movement of Water through Interconnections
- Development of New Interconnections
- Well Water Quality
- New Public Water Systems
- Viability of Small Water Systems
- Challenges of Operating Small Systems
- Disjointed Service Areas
- Exclusive Service Areas
- Source Water Protection
- Impact of Existing and Future Anticipated Regulations
- Continued Impacts of De-regulation of Electrical Industry
- Declining Revenue and Increasing Costs
- Conservation
- Lack of Fire Protection
- Infrastructure
- Lack of Funding

It will be important to review the issues and challenges identified in the context of public water systems (which is what the WUCCs are about) and determine which should be explored in the State Water Plan.

2.3.2 Regionalization of Small Public Water Systems

The very large number of small public water systems in the State of Connecticut is viewed by some as an inefficient method of providing water supply. Furthermore, the viability of these systems is an issue of concern, and they are potentially vulnerable to droughts because of limited storage and the duration that storage can sustain supply when rainfall deficits develop. A struggling or failure small public water system causes unacceptable risk to public health. Several sets of challenges facing the State include:

- Eliminating small systems may be possible in communities where larger public water system expansions have occurred, and therefore these larger systems are now adjacent to small systems. Barriers to connecting small systems to larger systems (thus eliminating the small separate systems) include lack of funding, lack of interest from the small system, potential changes in water quality, and potential changes in pressure.
- Many small water systems are owned and operated by entities not in the business of providing water. For example, there are many community water systems in Connecticut that are owned by (and contiguous with) private boarding schools. These schools have education as their chief objective, and may not be interested in water system management. However, with infrastructure in place, there may be little incentive to regionalize.
- Many large water utilities own and operate numerous small systems. Operational requirements, such as regulatory permitting, technical assessment, system maintenance, infrastructure replacement, and water supply need place a heavy burden on these water utilities, some of which operate multiple disconnected systems. A disproportionate amount of time and money is required to properly operate small systems.

Barriers to consolidation or regionalization of small water systems include cost, engineering considerations, the influence of local home rule, regulatory and public opposition to large system expansions or interconnections, and consumer preference.

At the same time, there are many areas in Connecticut that are completely devoid of public water system coverage, but the presence of a public water system is desired. Small systems will tend to be created in these areas over the long term, adding to the number of small systems even if others are consolidated or connected to larger systems.

2.3.3 Impacts of Changes in Water Consumption

Water conservation (described in paper 1B-3: Water Management Alternatives) clearly results in reduced consumption, and the retention of water in storage or in streams where it can serve multiple needs. With continued conservation, however, water systems and customers have been challenged by declining revenue. This has, in some cases, made paying for infrastructure more challenging. Declining revenue can also provide a disincentive for additional conservation, presenting another challenge. Examples can be found throughout the state. Creative solutions are needed to recapture lost revenue and/or pay for maintenance and improvements. An

example the water revenue adjustment process available for PURA-regulated water utilities as tool to address lost revenues.

It is important to note that there are sometimes differing views between privately-owned (PURA-regulated), municipal, and regional water utilities about whether costs for infrastructure can or should be borne by ratepayers or through grants that are funded by the general taxpayers for the benefit of a limited portion of the population.

2.4 Watershed and Aquifer Protection Where Incentives Are Lacking

2.4.1 Coordination and Consideration in Headwater Areas

Because the State of Connecticut does not allow withdrawal of Class B quality (or lower quality) surface waters for public water supply, water utilities in Connecticut have traditionally focused on acquiring land in rural areas where Class A streams are present. These areas have been acquired for reasons such as source protection (public water supply watershed protection) and future potential supply development. The Class A streams in these rural areas are often headwater streams (perhaps first order or second order). Communities in these areas have typically benefitted from the constraints on development in these areas of public water supply protection and future potential sources.

With the enactment of the Streamflow Standards and Regulations and its early phases of implementation underway (classification of all watercourses), most of the streams in the areas of public water supply protection and future potential sources are being designated Class 1 or 2. However, Class 1 and 2 streams will rarely be used for public water supply, going forward, because the Streamflow Standards require them to remain as close to naturally free-flowing as possible. There may be exceptions in those cases where the classification process was advised by the identification of potential future sources of public water supply in water supply plans; or where a classification can be changed.

The designation of Class A watercourses (per the Water Quality Standards) as Class 1 or 2 (per the Streamflow Standards) therefore presents a catch 22. Streams that have quality suitable for public water supply will not likely be used for public water supply. This will push the State to identify other solutions, such as those discussed in the 1B-3 paper (Water Management Alternatives).

However, another facet of this paradox is that the inability to use headwater regions for public water supply may dissuade water utilities and communities from protecting these areas. This is because it is difficult to justify to ratepayers the incurring costs for lands that do not provide a benefit for public water supply. Without protection for the purpose of public water supply watershed protection (or future source protection), other tools may be needed to protect the rural headwater regions of the State.

A related challenge is that water utilities that have spent significant funds to preserve headwater areas may view this long-term investment as wasted, if these areas are no longer available for water supply.

2.4.2 Aquifers Outside “Aquifer Protection Areas”

As explained in the 1B-1 paper, the State’s Aquifer Protection Area Program is designed to protect the areas of contribution to existing wells developed in stratified deposits (sand and gravel aquifers) that supply over 1,000 people. Proposed wells are not included in the program until such time that water utilities develop these wells and secure approvals from DPH and DEEP for use. Municipalities that have jurisdiction over land in the Aquifer Protection Areas are required to adopt regulations for these areas. The regulations are based on the State’s model regulations. The program has provided critical protection for the State’s most important public water supply aquifers, but it is fundamentally an enhanced wellhead protection program. The program does not protect aquifers that are not used for public water supply.

Municipalities in Connecticut are entitled to protect aquifer systems through other means, such as separate sets of regulations. For example, applicants for land use proposals that are located over the Pootatuck aquifer in Newtown must prepare evaluations of how the development will or will not affect certain aspects of the aquifer. However, many municipalities do not maintain separate sets of regulations for their sand and gravel aquifers. The State of Connecticut should determine whether there is a need to incentivize additional protections in municipalities, especially given the preference of the municipalities for home rule land use regulation.

2.4.3 Land Use Practices (i.e. LID)

LID is described in the 1B-1 paper (Current Water Management Structure) in the context of existing water management structures and programs in Connecticut. A recently published report “State of LID” from UCONN can be found here:

<http://nemo.uconn.edu/publications/2016stateofLID.pdf>

There are existing Statewide barriers to LID, which are unrelated to watershed protection. The above-referenced paper explains that some specific barriers are cost (or perceived cost), the lack of educational opportunities for various participants in the land use planning process, and maintenance required after LID is utilized. Other obstacles cited in the report include municipal staff resistance, lack of resources, the lack of economic incentives for LID, the need for clearer or stronger state guidance, and the difficulty of collaboration (between departments within one town or across town lines). As explained in the 1B-1 paper, DEEP is in the process of evaluating the incorporation of LID principles into the State’s Stormwater General Permits, the Connecticut Stormwater Quality Manual, and the Connecticut Guidelines for Soil Erosion and Sediment Control.

There are also situations where these may be barriers to LID in public water supply watersheds and over important aquifers. For example, some municipalities (e.g., Newtown) limit or prohibit infiltration of stormwater above certain aquifers. Other municipalities (e.g., Groton) have found it necessary to limit infiltration on a site within a public water supply watershed.

In general, LID is already challenging to promote and implement outside of public water supply watersheds and aquifer protection areas. It can be even harder to gain support for LID within public water supply watersheds and aquifer protection areas.

2.5 Water System Vulnerabilities and Security Issues

2.5.1 Changes Over Past Few Years

More than 15 years ago, Individual Water Supply Plans prepared by water utilities were available for public review. Sanitary Surveys and other sources of public water system information were also open to the public. Since the terrorist acts of 2001, the State's freedom of information law was amended (Section 1-210; Access to public records; Exempt records) to exclude the following from being made public: vulnerability assessments and risk management plans; operational plans; portions of water supply plans submitted pursuant to section 25-32d that contain or reveal information the disclosure of which may result in a security risk to a water company; inspection reports; and technical specifications and other materials that depict or specifically describe critical water company operating facilities, collection and distribution systems or sources of supply.

In the years subsequent to this change (approximately 2003 to the present time), State Agencies have directed members of the public to approach water utilities for information, or have provided heavily redacted documents. Water utilities have handled information requests differently, with some allowing the public to view (but not copy) information and others requiring that release forms be signed.

In the last few years, security concerns and the ability to obtain water utility information has ramped up due to the Water Utility Coordinated Committee (WUCC) process (described in the 1B-1 paper and below) and the legislation that authorized development of the State Water Plan. The Connecticut Water Works Association (CWWA) produced a key memo in November 2015 that articulates the types of information that the water utilities are comfortable sharing, and which have been very helpful in the planning process to date. The challenge is that not all information that is typically available for statewide water plans will necessarily be available in Connecticut, such as some individual withdrawal amounts, locations of withdrawals within a basin, etc.

2.5.2 Proposals for Legislation

During the 2016 legislative session, a series of discussions between environmental groups, CWWA, and other entities occurred with the potential goal of modifying the FOIA exemptions regarding water system information. The bill was raised for a public hearing, but was not voted on by the Public Health Committee. Although a bill was not advanced, there is much anticipation in the State that modifications to the FOIA law exemption will eventually be taken up by the legislature and will be enacted. In the meantime, the most recent 2016 negotiated bill language can serve as guidance for evaluating the suitability of water utility information for public release.

2.5.3 Upcoming Effects of the WUCC Process

As explained in the 1B-1 paper, the WUCC representing each public water supply management area (PWSMA) convened in June 2016 with the goal of developing new coordinated water system plans over the two-year process from June 2016 through June 2018. The WUCC process is required by Statute and Regulations to include public comment periods for several different phases, with the first phase (Preliminary WSA) taking place in August and September 2016. DPH and the WUCCs have committed to producing documents that can be fully shared with the public

without any need for redactions. This is in stark contrast to the individual Water Supply Plans, which are exempt from the provisions of FOIA.

With the publication of the Preliminary WSA for the west, central, and east regions in mid-September 2016, residents of Connecticut now have access to basic water utility information that has not been readily available for several years. This will continue with the Integrated Reports in 2017-2018. Nevertheless, specific locational information will not be made public and specific information about various water utility assets, including components will not be published. At this time, this is not seen as a major hindrance to the State Water Plan, which will rely on regional summaries of water use and availability, rather than on individual utilities.

Although certain information will always remain secure and exempt from FOIA, one potential result of the WUCC process may be the fostering of a new era of information-sharing between water utilities and the public. This may happen more quickly, and perhaps more easily, than legislative changes.

2.5.4 Access to Data

The secure nature of data contained in Water Supply Plans and other water utility documentation has already slowed the pace of data collection for the State Water Plan, except in cases that the data is already available in public sources such as DEEP diversion permit files and on the DPH web site. The time needed for DPH, CT DAS, and/or water utilities to properly determine whether a specific data set can be shared for use in the State Water Plan has been a challenge, if only because the pace of the State Water Plan development is very rapid.

Going forward, there may be other reasons for the public to have access to certain public water system data and information. For example, the State Water Plan will likely be followed by an implementation phase as well as future plan updates. Quick access to data about historical withdrawals and projected demands will make plan implementation and updates more straightforward, although some information may remain protected in the interest of public safety.

2.6 Emerging Topics

2.6.1 The Food-Energy-Water Nexus

See 1B-1 for a discussion of the State Energy Strategy. The strategy calling for water conservation is well aligned with energy conservation.

Although agriculture is not a dominant water usage in Connecticut, some of the water used for irrigation in many Connecticut municipalities is derived from a service connection to the adjacent public water system. When this occurs, potable water (and often, treated water) from Class A sources is used for irrigation. This poses a challenge for future water management for two reasons; first, it requires energy to treat the water when it may not require treatment to drinking water standards, and second, it utilizes Class A water (in some cases) that could become more scarce in the future (see previous sections in this paper).

2.6.2 Emerging Contaminants

With the prohibition on using Class B waters for public water supply, many consumers of public water supplies are relatively protected from emerging contaminants such as pharmaceuticals

(compared to other states). However, there are thousands of septic systems in the state, so some of these contaminants are likely finding their way into some water supplies (both public and private, surface and groundwater). Additionally, the public water supply wellfields located along waste-receiving streams and rivers are inducing some fraction of the emerging contaminants (at unknown concentrations) despite the ability of these wells to pass the testing associated with the groundwater under the direct influence of surface water (GWUDI). Therefore, emerging contaminants are a valid concern in Connecticut, and a challenge going forward, while simultaneously becoming an additional reason to continue the policy of reserving Class A and AA waters for public water supply. The challenge to future planning is that not all drinking water (public or private) in Connecticut is currently disassociated from waste-receiving streams, and any potentially heavier reliance on such sources as Class A and AA waterways become fully allocated may begin to be inconsistent with the Class B prohibition.

Cyanotoxins are an emerging topic worthy of consideration for both water supplies and recreation. Climate change could play a significant role in the significance of cyanotoxins by increasing water temperatures and lowering water levels in lakes and reservoirs, making these water bodies more susceptible to cyanobacterial blooms.

The EPA has established limits for a relatively small number of chemicals in drinking water. Water is not routinely tested for chemicals which have no established regulatory limits. Some exceptions are chemicals that have come to the attention of EPA and are tested for on a one-time basis under the UCMR (Unregulated Contaminant Monitoring Rule). Chemicals not on the UCMR list can go totally untested. All of these non-regulated chemicals present a potential risk to water sources, especially ground water sources, in both public and private wells.

2.7 Aging Infrastructure

2.7.1 Coordination with WUCCs for Water Infrastructure

One of the goals of the current WUCC process is to identify areas of aging water supply infrastructure and identify pathways to address this aging infrastructure over the coming decades. This is also of interest to the State Water Plan, and the two planning processes should be coordinated in this regard (among other reasons to be coordinated).

2.7.2 Corresponding Wastewater and Stormwater Infrastructure

Like water supply and distribution infrastructure, the State's wastewater (sanitary sewer) and stormwater infrastructure is aging. Furthermore, the State has made efforts to keep up with changing water and sewer capacities by replacing pipes and pumping stations where needed, but we have not made gains keeping up with changing needs of stormwater systems. Climate change and the resulting changes in precipitation will necessitate that stormwater collection, treatment, conveyance, and discharge systems are all upgraded over time. The Connecticut Climate Change Preparedness Plan calls for upgrades to wastewater and stormwater systems to keep up with changing conditions.

2.8 Wastewater Treatment and Reclaimed Water

2.8.1 Wastewater Treatment and Effluent as Resource Recovery

Two water reclamation facilities have been established in the State. See 1B-3 (Water Management Alternatives) for the description of these facilities. It is difficult to conceive of a mechanism that the average municipal water and sewer departments could fund construction of reclaimed water facilities, and even if they could, it would be challenging to identify customers for this water.

2.8.2 Stormwater Management

Individual communities must fund and comply with MS4 Stormwater requirements on their own. These requirements may be uniform from one community to another, but they may not be implemented the same from one community to the next because of the diversity in the State's municipalities. Furthermore, by their nature they are not always coordinated within river basins, where the causal mechanisms of stormwater are evident (as opposed to community boundaries), and where redirection of stormwater may impact groundwater. Furthermore, climate change could result in increased rainfall which could increase stormwater flows and loads even further, presenting physical challenges and financial challenges to individual communities throughout the state.

2.9 Treatment Technology

Connecticut regulations have reduced allowable nitrogen and phosphorus effluent limits that impact wastewater treatment, necessitating additional facilities and higher levels of treatment. The challenge will be to keep up technologically with interstate initiatives to restore the Long Island Sound. While the merits of improved water quality and compliance with evolving regulations are clear, the financial costs are high. Communities across the United States are faced with required expenditures on wastewater treatment that divert funds from other necessary projects. The challenge has been, and will continue to be, to ensure that technological improvements in wastewater treatment yield commensurate benefits in improved water quality in targeted receiving water bodies. Only then can the expenditures be fully justified in the face of so many other competing needs.

2.10 Extension of Sewer Systems and/or Water Systems

2.10.1 Coordination with Planning and/or Constraints from New State Conservation and Development Policies Plan

The State Conservation and Development Policies Plan (C&D Plan) is a statement of the state's growth, resource management, and public investment policies. It provides a policy and planning framework for the administrative and programmatic actions and capital and operational investment decisions of state government, which in turn influence the future growth and development of Connecticut.

The Connecticut General Assembly, in accordance with Sections 16a-24 through 16a-33 of the Connecticut General Statutes, establishes the C&D Plan. The policies of the C&D Plan are intended to guide the planning and decision-making process of state government relative to: (1) addressing human resource needs and development; (2) balancing economic growth with environmental protection and resource conservation concerns; and (3) coordinating the

functional planning activities of state agencies so as to accomplish long-term effectiveness and economies in the expenditure of public funds.

The C&D Plan consists of the plan narrative and the locational guide map (LGM). The LGM classifications are intended to help state agencies comply with administrative requirements, including that no state agency, department or institution may provide funding for a growth-related project unless such project is located in a priority funding area (PFA). Special exceptions allow for funding a growth-related project that is not located in a PFA upon determination that such project is consistent with the plan of conservation and development of the municipality in which such project is located and that such project:

1. enhances other activities targeted by state agencies, departments and institutions to a municipality within the priority funding area;
2. is located in a distressed municipality, as defined in section 32-9, targeted investment community, as defined in section 32-222, or public investment community, as defined in section 7-545;
3. supports existing neighborhoods or communities;
4. promotes the use of mass transit;
5. provides for compact, transit accessible, pedestrian-oriented mixed use development patterns and land reuse and promotes such development patterns and land reuse;
6. creates an extreme inequity, hardship or disadvantage that clearly outweighs the benefits of locating the project in a priority funding area if such project were not funded;
7. has no reasonable alternative for the project in a priority funding area in another location;
8. must be located away from other developments due to its operation or physical characteristics; or
9. is for the reuse or redevelopment of an existing site.

CGS Section 16a-31(a) requires state agencies to determine the consistency of their proposed actions with the state C&D Plan, including extension of existing sewer and/or water systems. In making this determination, the agency must first determine if a proposed project is considered a "growth-related project" pursuant to CGS Section 16a-35c(a)(2).

2.10.2 Approaches Available for Sewer Extensions for Development

Extension of sewer systems may proceed with private or local funding. If state funding will be utilized, the project must: (a) demonstrate consistency with the C&D Plan; and (b) undertake an assessment of potential adverse impacts on the environment in accordance with the Connecticut Environmental Policy Act (CEPA).

The wastewater treatment plant and service area expansion in Griswold is one example where state funding was used to extend a significant sewer system. CEPA documentation was published in the late 2000s to support the facility and sewer service area expansion, thus ending a sewer

hook-up moratorium that had been imposed by the then Connecticut Department of Environmental Protection. The moratorium had been in place since 1989, severely limiting commercial and industrial development in Jewett City and portions of Griswold and Lisbon. The CEPA document included a rigorous evaluation of the State C&D Plan in effect at that time, particularly with regard to the future service area and underlying designation in the State Plan. The plant and sewer system expansion were subsequently constructed, in part with state funding.

More recently, the Town of Mansfield undertook a similar effort in evaluating consistency of a proposed sewer extension to the Mansfield Four Corners area, located within a PFA and Balanced PFA. The Town has determined that providing public sanitary sewer service is essential for the vitality of the Four Corners area, which has a history of contamination from failing septic systems and leaking underground storage tanks. Numerous properties in the Four Corners area have had, and continue to have, chronic wastewater disposal difficulties. Additionally, development that would otherwise be consistent with local, regional, and state land use plans has not been realized in the Four Corners area due to a combination of poor soil conditions, high groundwater, lot size, and site constraint factors. A CEPA Environmental Impact Evaluation was published in January 2016 to support \$3M in funding through DEEP. The EIE and Record of Decision are currently under review by OPM.

In other communities, Ledyard Center being just one, state funding of a sewer extension has been thwarted in the past by virtue of inconsistency with the State C&D Plan. Ledyard's municipal Plan of Conservation and Development (last updated in 2003) recognizes that sewer capacity in Ledyard is a limited resource and that many developable areas remaining in Ledyard are characterized by shallow depth to bedrock, steep slopes, a high groundwater table, and/or the presence of wetlands. Ledyard's Plan identifies as a strategy for provision of sewer and water infrastructure to commercial and industrially zoned areas such as along Route 12 and Ledyard Center to facilitate the growth of commercial development. The prior State C&D Plan (2004 – 2009) designated Ledyard Center as a Rural Community Center; thus extension of public sewer service to this area was deemed to be inconsistent with the C&D Plan and ineligible for state funding. The current C&D Plan designates this area as a Village Priority Funding Area, which could potentially proceed with state funding of public sewer service if the sponsoring state agency can document that the extension will help sustain village character.

2.10.3 Approaches Available for Sewer Extensions Beneficial to Water Quality

In some instances, existing development has occurred in areas that do not support on-site wastewater disposal systems, often as a result of poor soil conditions, a high water table, or small lot sizes. Failing or underperforming septic systems have the potential to impact adjacent wetlands and watercourses, cause contamination of drinking water supply wells, and/or create a condition that is harmful to public health. In such instances, sewer extensions can significantly benefit water quality and improve public health conditions.

In summary, the primary challenges associated with sewer system expansion in Connecticut are inconsistency with state, regional, and local plans; local opposition due to perceived induced development; inability to secure State funding when the action is contrary to the C&D Plan to the point that the inconsistency cannot be resolved; and lack of funding in general.