4.0 EXISTING ENVIRONMENT

4.1 LAND USE AND ZONING

An understanding of land use plans and policies at the local, regional, and state levels is essential to the analysis of potential alterations of land uses in a project area. Consistency of the proposed action with these plans, policies, statutes, and regulations is evaluated throughout this document.

4.1.1 STATEWIDE PLAN OF CONSERVATION AND DEVELOPMENT

A basic introduction to the Conservation and Development Policies Plan for Connecticut (2005-2010) was presented in Section 1.5. The state is currently drafting a revised plan for 2013-2018; a final draft for legislative action is not expected until December 2012. Therefore, the *2005-2010 Conservation and Development Policies Plan* (State Plan) is still in effect. Not all plan policies are included in this discussion as they may not directly apply. For an expanded review of the plan, the reader is directed to the full document on file with the Connecticut Office of Policy and Management (OPM).

The Connecticut General Assembly, in accordance with Sections 16a-24 through 16a-33 of the Connecticut General Statutes, establishes the plan. The policies of the 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 economy in the expenditure of public funds.

The plan espouses six statewide growth management principles:

1. *Redevelop and revitalize regional centers and areas with existing or currently planned physical infrastructure.*
2. *Expand housing opportunities and design choices to accommodate a variety of household types and needs.*
3. *Concentrate development around transportation nodes and along major transportation corridors to support the viability of transportation options.*
4. *Conserve and restore the natural environment, cultural and historical resources, and traditional rural lands.*
5. *Protect and ensure the integrity of environmental assets critical to the public health and safety.*
6. *Promote integrated planning across all levels of government to address issues on a statewide, regional, and local basis.*

The accompanying *Conservation and Development Plan Locational Guide Map* apportions the state into land categories according to each area's characteristics and suitability for different forms of development or conservation activities. The categories of land use are as follows:

Development Areas

- Regional Centers
- Neighborhood Conservation Areas
- Growth Areas
- Rural Community Centers

Conservation Areas

- Existing Preserved Open Space
- Preservation Areas
- Conservation Areas
- Rural Lands
- Level A&B Aquifer Protection Areas
- Historic Areas

Definitional criteria for each conservation and development category are provided on the OPM website. Based on these criteria, public water service is encouraged in Regional Centers, Neighborhood Conservation Areas, and Growth Areas. While public water service is also considered appropriate in Rural Community Centers, the plan states that large-scale public service systems should be avoided. Public water service is considered inconsistent with land uses in the Conservation categories. Refer to Figure 4.1-1 for a depiction of potential pipeline routes overlain on the *Conservation and Development Plan Locational Guide Map*. Table 4.1-1 presents a listing of state Conservation and Development categories along potential pipeline routes.

As shown in the table and corresponding map, the majority of pipeline segments are located adjacent to Conservation Areas (shaded green on table) while a lesser amount are located adjacent to Development Areas (shaded pink on table). For example, areas in East Hartford, Manchester, Vernon, and near the University of Connecticut (University) campuses in Mansfield are primarily Development Areas while areas in Bolton, Coventry, Tolland, and the remainder of Mansfield are almost entirely Conservation categories. Each of the Development areas already has public water service through one provider or another with the exception of the Rural Community Center in Coventry.

While areas utilizing public water service are typically mapped as Regional Centers, Neighborhood Conservation Areas, Growth Areas, and (to a lesser extent) Rural Community Centers, it is common for water sources to exist in Conservation categories. For example, both of the University's current supply sources are located in the categories of Conservation Area, Preservation Area, or Rural Land, and its transmission mains also traverse such areas. This fact is pertinent for two reasons. First, a new water main need not necessarily provide water service to surrounding properties. Second, while a water main that could supply public water may be inconsistent with surrounding land uses, the conveyance of water to Development Areas is not in and of itself inconsistent with any surrounding Conservation categories.

All of the analyzed well sites considered in this Environmental Impact Evaluation (EIE) are located in Conservation categories. MD-1 and MD-3 are located in Conservation Areas while the remaining seven potential well sites are located in areas denoted as Existing Preserved Open Space. This is consistent with the need to protect future sources of water supply.

Legend

- Potential Water Mains
- Growth Area
- Neighborhood Conservation
- Regional Center
- Rural Community Center
- Existing Preserved Open Space
- Preservation Areas
- Conservation Areas
- Rural Lands
- Aquifer Protection Area
- Historic Area
- Town Boundary

Ellington
Tolland
Willington
Ashford
Vernon
University of Connecticut
Chaplin
Mansfield
Coventry
Manchester
Bolton
East Hartford
Andover
Glastonbury
Hebron
Columbia
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SOURCE(S):
Connecticut Office of Policy and Managment

State Conservation and Development Policies Plan 2005-2010

University of Connecticut Environmental Impact Evaluation
Potential New Source(s) of Water Supply

Hartford & Tolland Counties, Connecticut

Map By: scottb
MMI#: 1958-59
MXD: H:\1958-59\GIS\Maps\Report\Figure4.1-1.mxd
1st Version: 8/13/2012
Revision: 11/5/2012
Scale: 1 in = 8,000 ft

Figure 4.1-1

TABLE 4.1-1
State Conservation and Development Categories Along Proposed Pipeline Routes

Segment	Town	RC	NCA	GA	RCC	EP	PA	CA	RL	APA	HA
1	East Hartford	✓	✓				✓				
	Manchester			✓							
2	Manchester	✓	✓	✓			✓	✓		✓	
	Bolton					✓	✓	✓	✓	✓	
	Coventry				✓	✓	✓	✓	✓		✓
	Mansfield						✓	✓			
3	Mansfield							✓			
4	Mansfield							✓			
5	Mansfield			✓				✓	✓		
6	Mansfield		✓	✓		✓		✓	✓		
7	Manchester		✓	✓			✓			✓	
	East Hartford		✓					✓			
	South Windsor		✓								
	Vernon		✓	✓				✓	✓	✓	
	Tolland				✓	✓		✓	✓		
8	Tolland				✓						
9	Tolland				✓		✓				
10	Tolland				✓		✓				
11	Tolland						✓	✓	✓		
	Coventry							✓			
12A	Coventry							✓			
	Mansfield						✓	✓	✓		
12B	Coventry							✓			
	Mansfield						✓	✓	✓		
13	Mansfield						✓	✓	✓		
14	Mansfield			✓			✓	✓	✓		
15	Mansfield					✓	✓	✓	✓		
16	Mansfield								✓		
17	Mansfield					✓		✓	✓		
18	Mansfield			✓			✓	✓	✓		
19	Mansfield		✓	✓			✓	✓			
20	Mansfield			✓							
21	Mansfield			✓							
22	Mansfield							✓			
23	Mansfield					✓	✓	✓			
24	Mansfield					✓		✓			
25	Mansfield						✓	✓			
26	Mansfield					✓		✓			
27	Mansfield							✓			
28	Mansfield					✓		✓			✓

TABLE 4.1-1 (Continued)
State Conservation and Development Categories Along Proposed Pipeline Routes

Segment	Town	RC	NCA	GA	RCC	EP	PA	CA	RL	APA	HA
29	Mansfield					✓		✓			
30	Mansfield					✓		✓			✓
31	Mansfield						✓	✓			
32	Mansfield					✓	✓	✓			
33	Mansfield					✓		✓			
34	Mansfield							✓			✓
35	Mansfield					✓	✓	✓			
36	Mansfield						✓	✓		✓	✓
37	Mansfield		✓				✓	✓			
38	Mansfield							✓			
39	Mansfield		✓			✓	✓	✓	✓		
40	Mansfield		✓				✓	✓			✓
41	Mansfield					✓		✓	✓		
42	Mansfield					✓		✓			
43	Mansfield							✓			
44	Mansfield		✓					✓	✓		
45	Mansfield		✓					✓			
46	Mansfield		✓								
47	Mansfield		✓								
48	Mansfield		✓				✓				
49	Mansfield		✓	✓							
50	Mansfield		✓								
51	Mansfield							✓			
52	Mansfield							✓			
53	Mansfield							✓			
54	Mansfield		✓	✓			✓	✓	✓		
55	Mansfield							✓	✓		
56	Mansfield							✓			
57	Mansfield			✓		✓		✓	✓		
58	Mansfield			✓							
59	Mansfield							✓			
60	Mansfield			✓				✓	✓		
61	Mansfield			✓				✓			
62	Mansfield							✓	✓	✓	
63	Mansfield					✓	✓	✓		✓	
64	Mansfield							✓		✓	

Notes: RC = Regional Center; NCA = Neighborhood Conservation Area; GA = Growth Area; RCC = Rural Community Center; EP = Existing Preserved Open Space; PA = Preservation Area; CA = Conservation Area; RL = Rural Lands; APA = Aquifer Protection Area; HA = Historic Area. Pink shading denotes Development categories.

4.1.2 REGIONAL LAND USE PLANS

Municipalities where potential pipeline routes have been located lie within two separate regional planning agency territories. The municipalities of Coventry and Mansfield are part of Windham Region Council of Governments (WinCOG) while East Hartford, Manchester, Bolton, South Windsor, Vernon, and Tolland are part of the Capitol Region Council of Governments (CRCOG). Regional planning organizations in Connecticut are encouraged to prepare land use plans that include recommendations for future land use, public utilities, and other conservation and development policies that will be beneficial to the region. A regional land use plan is advisory to its member communities but is cumulative of local planning efforts. A regional land use plan is intermediate between local plans and the State Plan.

WinCOG

WinCOG encompasses 327 square miles in east-central Connecticut and has nine member communities: Chaplin, Columbia, Coventry, Hampton, Lebanon, Mansfield, Scotland, Willington, and Windham. The region is a predominantly rural area with the exception of Willimantic and Storrs. Storrs and the Willimantic portion of the town of Windham are the economic centers, cultural centers, and urbanized areas of the region.

In comments sent to Mr. Steve Messer of the Connecticut Department of Public Health (DPH) on November 2, 2011 regarding the 2011 University of Connecticut *Water Supply Plan*, WinCOG indicated that a proposal to increase the water supply on the Storrs Campus was consistent with the 2010 *Windham Region Land Use Plan* (Section 1.5). The plan identifies Willimantic (including portions of the Route 195 corridor in southern Mansfield) and Storrs, including the University Main Campus and Mansfield Four Corners (intersection of Routes 44 and 195) as Regional Centers. According to the plan, "Regional Centers are the highest priority for all forms of redevelopment and development including commercial, urban-density residential, and industrial. Remediation and infill are strongly encouraged" where appropriate. In regard to the University, the plan states that "development should be sensitive to water resources and public water supply recharge areas particularly as it relates to impacts to the Fenton and Willimantic River systems."

The 2010 WinCOG Plan further identifies several Rural Community Centers throughout the region outside of Willimantic and Storrs. In regard to potential pipeline routes, North Coventry, Mansfield Depot, Eagleville, and Mansfield Center are all noted as Rural Community Centers. The 2010 plan notes that these areas "*have relatively higher development densities than the surrounding lands and are the focus of rural community activity. These areas usually have no public water or sewer service*." Such areas "*are appropriate for commercial and residential redevelopment and development*" provided that any activity "*preserves and reinforces the character of the Rural Community Center*."

Additionally, the 2010 plan identifies several Commercial Nodes that are "*clusters of commercial and/or industrial activity in otherwise sparsely developed areas*." Only two Commercial Nodes lie within potential pipeline routes: The Bolton/Coventry Town Line area and the intersection of Route 44 and 31 in Coventry. The 2010 plan recommends these Commercial Nodes as being the "*most appropriate locations for compact, medium-scale commercial retail and industrial-*

enterprise development in rural areas without public utilities" with the intent of minimizing sprawling development along highways in otherwise rural areas.

WinCOG designated the remainder of available land within the study area as primarily Rural Conservation and Priority Preservation Areas. Preservation Areas are intended to protect a valuable resource and are expected to remain intact as much as feasible. Rural Conservation Areas represent lands vulnerable to development. Historic areas are also noted. Potential pipeline routes could pass through historic areas such as the Glass Factory Historic District in Coventry and the Mansfield Training School Historic District, the UConn Historic District, the Spring Hill Historic District, and the Mansfield Center Historic District in Mansfield.

The 2010 WinCOG Plan encourages focusing development in Regional Centers, Commercial Nodes, and Rural Community Centers but recognizes that some development will occur in Rural Conservation Areas. The plan establishes priority actions to help manage development in these areas, such as modifying zoning regulations to encourage protection and discourage structure development unless directly compatible with conservation and preservation goals.

CRCOG

CRCOG encompasses 761 square miles representing 30 communities in north-central Connecticut. Hartford and its surrounding suburbs are at the core of the Capitol Region, which extends to more rural areas to the west and east.

CRCOG prepared an update in 2009 to its land use plan entitled *Achieving the Balance: A Plan of Conservation and Development for the Capitol Region*. It is "*not a detailed land use plan but rather a general guide for future conservation and development of the Capitol Region*." Of particular interest for this assessment are the following recommendations:

- Natural resources should be evaluated and managed on a watershed basis.
- CRCOG should work with Connecticut DPH and the towns of Tolland, Andover, and Bolton to develop a partnership with water service providers or encourage their assignment to an exclusive service area (ESA).
- Oppose interbasin diversion of surface and groundwater.

The 2009 CRCOG Plan includes several maps outlining potential development areas, potential conservation areas, and future land use in the region. The plan identifies an "Area of Regional Significance" along the Interstate 84 corridor in northern Manchester. This area can support large, regional-scale commercial and industrial development and already has public water service. The Land Use Policy Map in the *2009 CRCOG Regional Plan* identifies Priority Conservation Areas as well as Development Areas of varying intensities as well as Municipal Focus Areas. These are defined below:

- Lower Intensity Development Areas are "open lands that may be cultivated or sparsely settled." Low-density detached residential style development is anticipated in these areas. This designation exists along Interstate 84 and Route 195 in Tolland.

- Middle Intensity Development Areas – 1 are primarily "detached single-family houses and/or neighborhood scale commercial establishments and/or industrial establishments surrounded

by lawns and landscaped yards." This land designation occurs along Interstate 84 in Vernon and Tolland, Route 195 in Tolland, and along Route 44 and Interstate 384 in Bolton.

- Middle Intensity Development Area – 2 areas "allow greater intensity of mixed use; buildings may be totally residential or a mix of office/retail/commercial or small lodging." These areas are typically village centers. This land designation exists along Silver Lane in East Hartford, Interstate 384 in Manchester, and along Interstate 84 in Manchester, Vernon, and western Tolland. The Route 195 corridor near Interstate 84 in Tolland also has this designation.

- Higher Intensity Development Areas include "downtowns, major business corridors, urbanized neighborhoods, village centers and mixed use development." This land designation exists along Interstate 84 in Manchester, South Windsor, and Vernon, along Silver Lane in Hartford, and along Interstate 384 in Manchester.

- Municipal Focus Areas are areas identified by local officials to include existing or potential development or conservation areas. They "represent existing conservation and development efforts that are in keeping with the goals and policies of the CRCOG Regional Plan." These are outlined by town below:

  - Manchester has a commercial/retail/mixed-use center or corridor located north of Interstate 384. Interstate 84 runs between two technology/business centers as well as a commercial/retail/mixed-use center or corridor in northern Manchester. These areas already have public water service available from the Manchester Water Department.

  - Bolton considers its segment of Route 44 to be a commercial/retail/mixed-use corridor. This area has only small water systems providing water to limited areas such as subdivisions such that water service is predominantly by individual wells.

  - Several areas adjacent to Interstate 84 in Vernon are noted as Conservation, Greenway/Open Space Connection/Sustainable Development areas. An area in northeast Vernon just north of Interstate 84 is denoted as a commercial/retail/mixed-use center or corridor. These areas already have public water service available from The Connecticut Water Company.

  - Tolland has identified the potential for transit-oriented development located just north of Interstate 84 on Route 195 and another area to the south on Route 195 as a technology/ business center. Both of these areas already have public water service available through The Connecticut Water Company and the Town of Tolland.

4.1.3 LOCAL LAND USE PLANNING

Town of Bolton

The Town of Bolton adopted its *Plan of Conservation and Development* in 2005. At the time the plan was prepared, the extension of sanitary sewers along Route 44 was a chief concern in the town. Goal #1 of the *Plan of Conservation and Development* is "*regulate the land use within the sewer service area [along Route 44] and the extent that existing and new land uses may connect to the sewers*." In addition:

- Goal #1/Policy #1 (Purpose of Sewers) states that the sewer system will *"provide opportunities for new and expanded businesses in the Route 44 corridor. The majority of businesses in Bolton are already located along Route 44 and the majority of the business and industrial zoned areas are located along this highway. The remainder of the town has a distinctly different rural and residential character. It is the intent of the town to maintain these distinct business and residential areas."*

- Goal #1/Policy #3 (Zoning in the Sewer Service Area) states that *"the zoning regulations for the residential portions of the sewer service area should incorporate special permit requirements to discourage new development on older unoccupied properties that cannot support septic systems and do not conform to the current zoning regulations. The zoning regulations for the business and industrial portions of the sewer service area should encourage new development for both developed and undeveloped properties. Consideration should be given to creating new business and industrial zones for the sewer service area that could allow a greater variety and density of uses than in the non-sewered areas."*

- Goal #1/Policy #4 (Other Utilities in the Sewered Area) states that *"Extensions of water mains and natural gas mains along Route 44 in the sewered area should be encouraged. Water mains provide large and reliable volumes of potable water and improve fire protection. Water mains will allow businesses with high water demands such as restaurants and businesses with fire protection requirements, such as sprinklers, to locate in the sewered area."*

The conclusion of the Bolton *Plan of Conservation and Development* notes that the State Plan is not consistent with the Bolton plan relative to the sewer service area along Route 44. Specifically, Bolton's plan states that "*the State Plan does not recognize the long-existing commercial and business zoned areas in the Route 6 and Route 44 corridors, which contain the vast majority of the town's businesses and industries. The State should continue to be encouraged to review its statewide Plan of Conservation and Development to address the existence of this significant commercial/industrial area that functions as an important part of the regional economy and the landscape in eastern Connecticut*."

The Town of Bolton and CRCOG completed the Route 44 Strategic Corridor Plan in 2008. The "*Route 44/Bolton Strategic Corridor Plan is the product of the Town's proactive planning initiative and provides a blueprint and implementation plan for the Town's desired land-use pattern and roadway improvements in the Route 44 corridor into the future*." In order to achieve the vision that Bolton has for the Route 44 roadway corridor, the corridor plan states that future development will be guided by the following 'Smart Growth' principles/policies:

- To preserve valued community and natural resources and safeguard land identified for preservation
- To encourage economic development consistent with the scale and character of activity described in the Route 44 Vision Statement
- To locate development where there is or will be infrastructure (water, sewer, and roads) and concentrate development there before using raw land
- To place priority on re-use of previously developed sites in targeted growth areas
- To place priority on locating new development in targeted growth areas

- To pursue a compact, mixed-use pattern of development for targeted growth areas that preserves or creates walkable neighborhoods and village character
- To foster a range of type and style of housing so that households from young adults to seniors can choose to live in town
- To promote a transportation system that encourages travel by a variety of means (walking, bicycling, and transit in addition to the automobile)
- To create a multi-faceted transportation system that conveniently links the targeted growth areas with one another and with the historic village center of Bolton

To accomplish the development desired by the Town of Bolton and articulated in its *Plan of Conservation and Development* and the corridor plan, the corridor plan recommended that the Route 44 corridor be rezoned and that the zoning regulations be revised. In order to provide sufficient time to revise the zoning map and zoning regulations, the Planning and Zoning Commission subsequently enacted two consecutive moratoriums on certain activities along Route 44. Activities subject to the moratorium included zoning map changes and zoning regulation changes initiated by applicants, subdivision applications proposing more than one new lot, site plan and special permit applications that proposed expansions of buildings or paved areas, and site plans and special permit applications for new buildings. The second moratorium expired on June 1, 2012. Revised zoning regulations were adopted and became effective on July 1, 2012.

The Town of Bolton has a strong vision for Route 44 and clearly desires the extension of water and sewer systems to support business and related development. As noted in the town's *Plan of Conservation and Development*, the current State Plan conflicts with the intended management of the Route 44 corridor. The Capital Region Plan of Conservation and Development designates the entire Route 44 corridor in Bolton as a "Municipal Focus Area" with Middle Intensity Development designated along the roadway.

Town of Coventry

The Town of Coventry adopted its *Plan of Conservation and Development* in 2010. The Coventry plan emphasizes the town's valued rural, agricultural, and open space-rich character. The Coventry plan identifies Preservation Focus Areas critical to maintaining the town's desired rural character. The plan describes three "Special Planning Areas for Growth and Infill" that are located along Route 44 (a total of 11 are designated in the town):

- "Special Planning Area 1: Rte 44/ Bolton Gateway – Commercial, Professional Office and adjacent Commercial Agricultural zones. The area presently contains several commercial/retail establishments on the south side of Route 44. Opportunities exist for new development, in-fill and re-use. There are two houses of historic value on Cedar Swamp Extension, and there is a significant vista to the south. There is good access to route I-384, with improvements to Route 44 in Bolton, and future sewer plans in Bolton present the opportunity to use this infrastructure. Utilize the commercial development design guidelines to consider the following:

    - Recognize that this area is the gateway to Coventry and creates a first impression of the Town.
    - Consider changing zoning regulations to provide larger setbacks and parking in the rear of commercial buildings.

- Apply access management strategies to minimize curb cuts and consider shared and interconnected parking.
- The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."

- "Special Planning Area 2: Rte 44/ Bread & Milk Street Commercial zone. The area currently contains several retail and service establishments on the north side of Route 44 and a public golf course on Bread & Milk Street. Opportunities exist for new development along the east side of Bread & Milk Street where there is a large vacant parcel that has had prior commercial interest. There is a historic house on the northwest corner of Route 44 and Bread & Milk Street. This area is not served by public sewer. A public water supply serves the adjacent Pilgrim Hills subdivision. Plan guidelines in this zone include the following:

  - Consider a community sewer treatment system.
  - Consider another access to Route 44 from the site east of Bread & Milk Street.
  - Minimize curb cuts particularly adjacent to the intersection.
  - Utilize the commercial development design guidelines.
  - Target businesses compatible with the neighborhood (Pilgrim Hills and Northfields subdivisions) and existing businesses.
  - The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."

- "Special Planning Area 3: North Coventry Village (Route 44/Route 31/Grant Hill Road) Commercial zone. One of the most active retail sites in town, this area includes Meadowbrook Plaza which, in 2009, received a significant exterior upgrade. The North Coventry Fire Station and the Coventry Grammar School are adjacent to the east. Several historic homes exist on Stage Road and north of Route 44 to the west. The Walgreens and the CVS/Bank site have further potential development adjacent to them. No sewers exist, but there is public water supply infrastructure on site. Consider an overall strategic plan for the area that includes:

  - The potential for a community septic system to serve the area
  - Careful attention to traffic patterns at and near the intersection, particularly on Route 44 near the entrances to Meadowbrook Plaza
  - A rear traffic access from Route 44 (south side) to Main Street (southwest side)
  - Respect the historic homes, the rural character, and the adjacent farms.
  - Utilize the commercial development design guidelines.
  - Target new development on the site east of Walgreens, northeast of Dunkin' Donuts, across Main Street from Dunkin' Donuts, the area adjacent to Meadowbrook Plaza, a site north of Route 44 west of the old Pomeroy Tavern, and a site north of Stage Road.
  - Consider shared and interconnected parking where possible.
  - Consider a zoning map change to restrict commercial access to Grant Hill Road.
  - Respect Coventry and Olson Brooks as natural resources.
  - Maintain or expand the green, landscaped areas adjacent to the intersection.
  - The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."

The three special planning areas along Route 44 are located between the Bolton town line and Carpenter Road, spanning roughly half of the length of Route 44 in Coventry. Special Planning Area 3 is approximately coincident with the state-designated Rural Community Center. None of the special planning areas in Coventry are located along the eastern half of Route 44 in the town.

The designation of a special planning area does not imply that development is desired throughout the special planning area. In fact, the Coventry *Plan of Conservation and Development* designates "preservation focus areas" in each of the three special planning areas along Route 44. Preservation focus areas make up the majority of Special Planning Area 1, the portion of Special Planning Area 2 on the south side of Route 44, and the southwest corner of Special Planning Area 3.

The Coventry plan also describes designated Special Planning Areas for Growth and Infill located along Route 195. This is Special Planning Area 7, "Rte 195 Neighborhood-Commercial zone." There is no commercial activity on this site. According to the *Plan of Conservation and Development*, the parcel is "*about ten acres in size and suitable for reuse, infill or new development. It is close to the Willimantic River Greenway and walking trails*." The plan states that "*on site sewer and water supply needs to be provided*" and points out that development should "*consider the proximity to Willington's and Mansfield's commercial nodes*."

Figure 4.1-2 shows the Town of Coventry's Recommended Future Land Use Map from its 2010 *Plan of Conservation and Development*. The potential interconnection with The Connecticut Water Company (CWC) that originates in Tolland on Route 195 would traverse the northeast corner of Coventry either along Route 195 and possibly Jones Crossing Road. According to the Coventry Future Land Use Map, the majority of this area is designated as a Preservation Focus Area centered on the Willimantic River. A Special Planning Area is designated on about 10 acres on the south side of Route 195.

Town of Manchester

The Town of Manchester adopted an amendment to the 1998 edition of its *Plan of Conservation and Development* in 2005. The land use plan and "development designations" maps in the plan remained unchanged from 1998 to 2005. Development and preservation areas were identified along Interstate 84; in this context, "preservation" refers to maintaining existing residential neighborhoods. Development, preservation, and revitalization areas were identified along Interstate 384.

Town of Mansfield

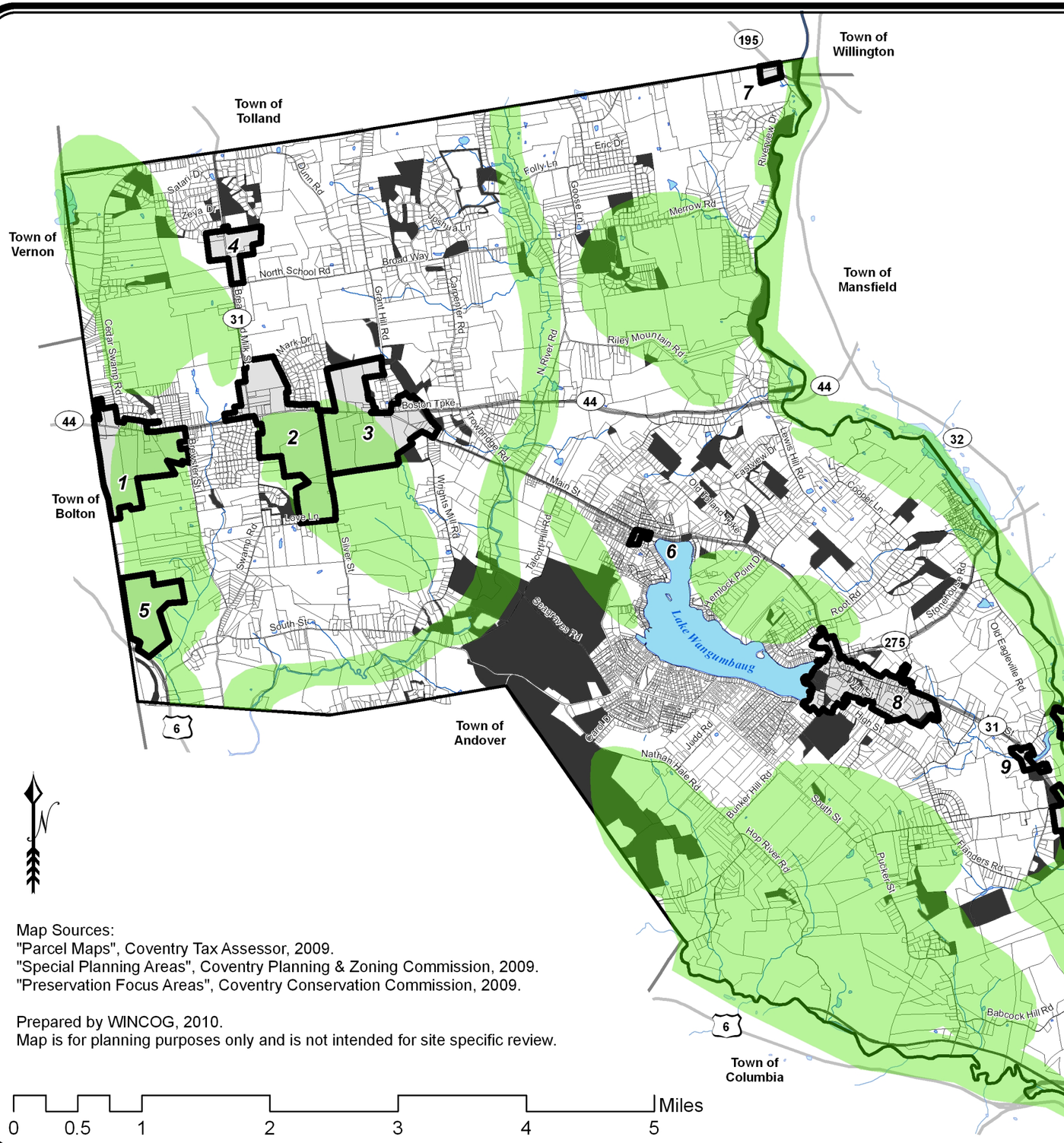
Mansfield's 2006 *Plan of Conservation and Development* identifies the following policy priorities:

- To strengthen and encourage an orderly and energy-efficient pattern of development with sustainable balance of housing, business, industry, agriculture, government and open space and a supportive infrastructure of utilities, roadways, walkways and bikeways and public transportation services

Town of Coventry, CT
Plan of Conservation & Development

11. Recommended Future Land Use

Preservation Focus Areas & Special Planning Areas



Preservation Focus Areas

Special Planning Areas

Permanently Protected Open Space

Number	Special Planning Areas	Acres
1	Rte. 44/Bolton Gateway	225
2	Rte. 44/Bread & Milk St.	312
3	North Coventry Village	301
4	Rte. 31 North	66
5	Rte. 6 Corridor	119
6	Daly Rd./Main St.	6
7	Rte. 195	12
8	South Coventry Village	208
9	Depot Rd./Main St.	14
10	Depot Rd. at Willimantic River	15
11	Rte. 31 South	57

Map Sources:
"Parcel Maps", Coventry Tax Assessor, 2009.
"Special Planning Areas", Coventry Planning & Zoning Commission, 2009.
"Preservation Focus Areas", Coventry Conservation Commission, 2009.

Prepared by WINCOG, 2010.
Map is for planning purposes only and is not intended for site specific review.

- To conserve and preserve Mansfield's natural, historic, agricultural and scenic resources with emphasis on protecting surface and groundwater quality, important greenways, agricultural and interior forest areas, undeveloped hilltops and ridges, scenic roadways and historic village areas
- To strengthen and encourage a mix of housing opportunities for all income levels
- To strengthen and encourage a sense of neighborhood and community throughout Mansfield

In keeping with these priorities, the Mansfield plan further identifies Planned Areas for Development, generally located around the University campus, Mansfield Four Corners, Route 44, near the former correctional facility site, Conantville, and Perkins Corner.

Figure 4.1-3 shows the Town of Mansfield's Planned Development Areas Map from Map 22 of Mansfield's *Plan of Conservation and Development*. The map identifies the intensity of development desired throughout the community. The potential interconnection with CWC that begins on Route 195 in Tolland has several alternative routes to the campus from the Mansfield town boundary. One such route is to continue along Route 195 to the W-Lot reservoir on campus located off Route 195 near Moulton Road. According to the town's plan, this potential route would pass through a small Neighborhood Business/Mixed Use Zone, a long stretch of Low Density Residential, two pockets of Planned Office/Mixed Use areas, and a Planned Business/Mixed Use area focused around the intersection of Routes 44 and 195. This intersection is also part of the Mansfield Four Corners Historic Village, which continues south along Route 195 as shown on the Planned Development Areas Map.

Figure 4.1-4 shows Mansfield's Existing and Potential Conservation Areas. A significant area of interior forest tracts is located south of Route 195 and adjacent to the Willimantic River. The CWC route passes by several small preserved open space parcels and an area of agricultural land near the University campus.

Another potential route for the CWC interconnection to the campus involves traversing Baxter Road south to Hunting Lodge Road. This route would still cross a neighborhood Business/Mixed Use Zone on Route 195 near the town boundary but would then pass through only Low Density Residential land to the campus. The last alternative would run south along Route 195, then west on Route 44 and south along a potential North Hillside Road extension. This route passes through all the same planned development areas as the first potential route, and additional Medium- to High-Density Institutional/Mixed-Use lands.

The interconnection to Windham Water Works (WWW) has several potential routes. One travels north on Route 195 from Conantville Road to the campus at Hanks Hill Road. This route passes through primarily Low Density Residential areas according to the town's plan. It also passes through two designated Historic Village areas: Mansfield Center and Spring Hill. Only Mansfield Center is under the purview of a Historic District Commission. There are small pockets of Neighborhood Business/Mixed Use and Planned Office/Mixed Use in both Historic Villages. According to the *Existing and Potential Conservation Areas* in Figure 4.1-4, this route passes a significant area of preserved open space on the west side of Route 195 (School House Brook Park), and interior forest tracts are prevalent. The route also crosses the Nipmuck Trail, a Connecticut State Greenway.

Planned Development Areas

Legend

- Historic villages or hamlets
- Medium to High-Density Institutional/ Mixed-Use
- Low Density Residential
- Medium to High Density Age Restricted Residential
- Medium to High Density Residential
- Planned Business/Mixed Use
- Planned Office/Mixed Use
- Agriculture/Medium to High Density Residential/Open Space
- Neighborhood Business/Mixed Use
- Flood Hazard Zone (Depicted for Reference Purposes)

Merrow
Mansfield Four Corners
Mount Hope
Wormwood Hill
Gurleyville
Mansfield Depot
Hanks Hill
Chaffeeville
Eagleville
Spring Hill
Atwoodville
Mansfield City
Mansfield Center
Mansfield Hollow
Chestnut Hill
Perkins Corners
Conantville
195
44
32
89
6

N

Map Sources

"Historic Villages", scale = 1:48,000, 2004, LA Dept. at UConn.
"FEMA Flood Insurance Rate Maps (FIRM)", scale = 1:24,000, 1981, Federal Emergency Management Agency (FEMA).
"Mansfield Digital Tax Map", scale = 1:24,000, 2001, Fuss & O'Neil.
"Planned Development Areas", scale = 1:24,000, 2005, WINCOG. Development classifications designated by the Planning and Zoning Commission.
"Roads", scale = 1:24,000, 1995, CT DEP.
"Towns", scale = 1:24,000, 1995, CT DEP.

Prepared by the Windham Region Council of Governments.
Map is for general planning purposes only and is not intended for site specific review.

Plan of Conservation and Development
April 2006

4000 0 4000 Feet

Map 22

Existing and Potential Conservation Areas*

Legend

- State Designated Wellfield Aquifer Areas
- Willimantic River Greenway with Buffer
- Nipmuc Trail/ CT Designated Greenway
- Existing Preserved Open Space
- Interior Forest Tracts
- Wetlands/Watercourses/Waterbodies (with 50 ft buffer) & Flood Hazard Zones
- Agricultural Land
- Medium to High-Density Residential/ Commercial/Institutional/Mixed-Use (Depicted for Reference Purposes)

* See Map 11 for State Natural Diversity Database Designations and Map 12 for Scenic Resources.

N

Map Sources

"Agricultural land", scale = 1:24,000, 2005, LA Dept. at UConn and WINCOG. Agricultural land developed with assistance from the Mansfield Agricultural Committee.
"Aquifer Protection Areas", scale = 1:24,000, 2004, CT DEP.
"Existing Preserved Open Space", scale = 1:24,000, 2004, LA Dept. at UConn.
"Interior Forest Tracts", scale = 1:24,000, 2005, LA Dept. at UConn and WINCOG. Interior forest tracts developed with assistance from Mansfield Open Space Preservation Committee.
"Mansfield Digital Tax Map", scale = 1:24,000, 2001, Fuss & O'Neil.
"Mansfield Wetlands", scale = 1:48,000, 2004, LA Dept. @ UConn.
"Roads", scale = 1:24,000, 1995, CT DEP.
"Towns", scale = 1:24,000, 1995, CT DEP.
Development Areas fully depicted on Map 22.

Prepared by the Windham Region Council of Governments.
Map is for general planning purposes only and is not intended for site specific review.

Plan of Conservation and Development
April 2006

4000 0 4000 Feet

Map 21

An alternative route for the connection to WWW would travel Route 195 north to Chaffeeville Road then west on Gurleyville Road to the Fenton River Well D pump house. This route would pass through the Mansfield Center Historic Village and associated pocket commercial areas, then through the small Historic Village area of Chaffeeville and the southern portion of the Gurleyville Village area before reaching the pump house. The majority of the route passes through Low-Density Residential areas.

Another alternative connection would be to new Willimantic River wellfields located west of the campus. Any of the potential routes for this alternative would pass through primarily Low Density Residential areas with the Mansfield Depot Historic Village area designation, according to the town's plan. This route passes through Agricultural Lands according to the Conservation Areas Map.

Finally, potential Mansfield Hollow wellfield connections would generally follow one of the potential WWW interconnection routes. The additional areas traverse from individual potential wellheads through primarily Low-Density Residential lands and the Historic Village areas of Mansfield Hollow, Mansfield Center, and potentially Atwoodville, as shown in Figure 4.1-5. According to the Existing and Potential Conservation Lands Map, these routes would traverse protected open space (Mansfield Hollow State Park) and interior forested areas.

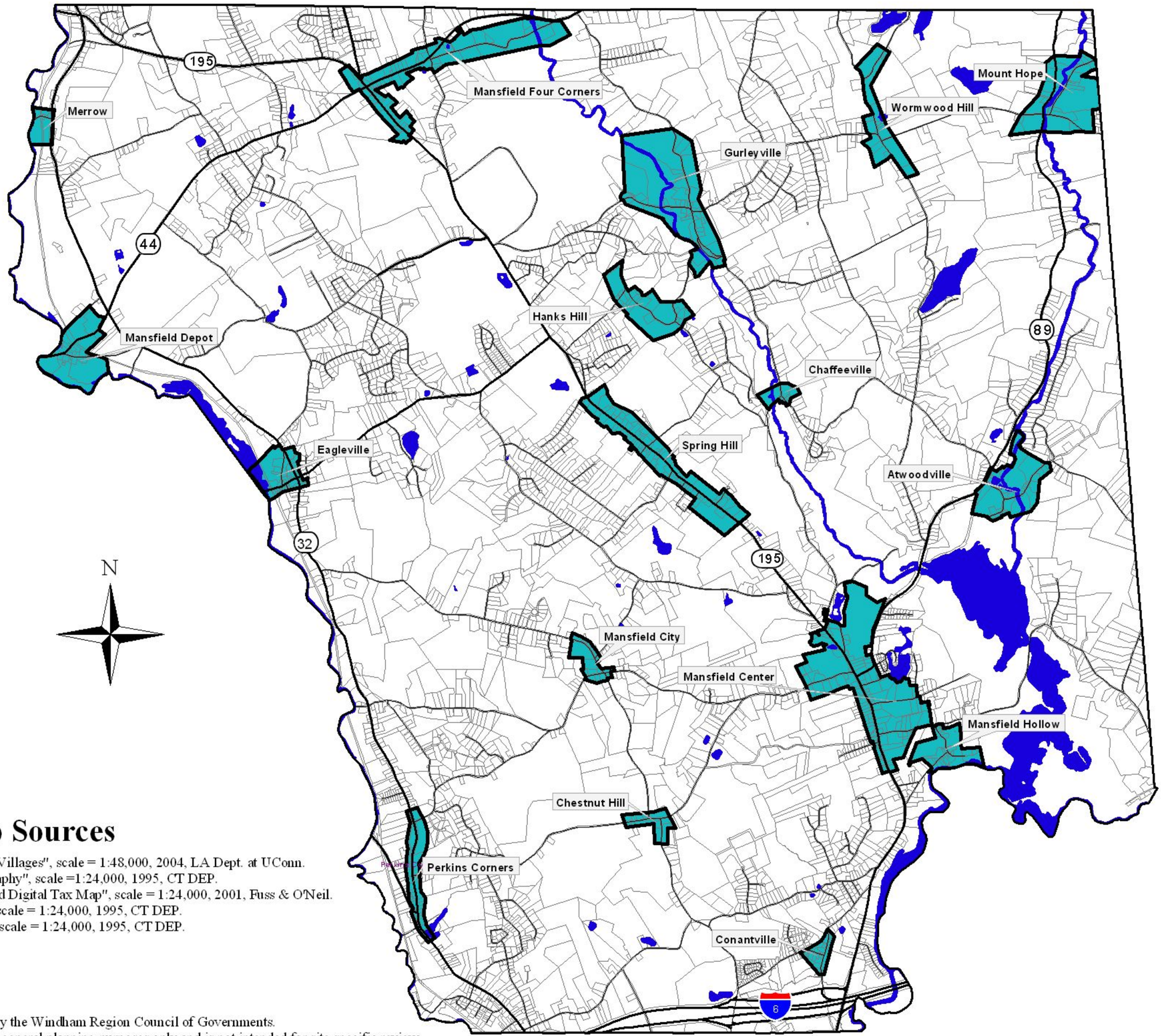
In November 2011, the Town of Mansfield was awarded a Community Challenge Planning Grant from the U.S. Department of Housing and Urban Development (HUD) Office of Sustainable Housing and Communities (OSHC) to assist in planning for growth anticipated as a result of the new Technology Park and expanded public water system while preserving the rural agricultural character and heritage of the community. The grant requires that the effort be completed by February 2015. During this time, the town will develop a Sustainable Design and Green Building Action Plan; identify housing, agriculture, and economic development strategies; update its *Plan of Conservation and Development*; and rewrite the zoning and subdivision regulations. Rather than proceed through a typical *Plan of Conservation and Development* update and piecemeal amendments to these regulations, the town will employ a broader approach and incorporate changes to the plan and regulations that will guide the town's development for many years to come.

Chief among the town's concerns is the development afforded by pubic water service. In its Request for Proposals (RFP) seeking consulting services for the planning effort, the town noted that "*finding a source of potable water is essential for town initiatives such as the development of an assisted living facility and redevelopment of the Four Corners area, which has been blighted due to contamination from failing septic systems and underground storage tanks. Yet this new water source causes concern that increased accessibility to public water will result in sprawl and undesirable development."* The RFP notes that *"the final [zoning and subdivision] regulations should clearly articulate the town's vision and objectives, providing clear guidance to developers as to what is expected*."

Historic Villages

Legend

Historic villages or hamlets



N

Map Sources

"Historic Villages", scale = 1:48,000, 2004, LA Dept. at UConn.
"Hydrography", scale =1:24,000, 1995, CT DEP.
"Mansfield Digital Tax Map", scale = 1:24,000, 2001, Fuss & O'Neil.
"Roads", scale = 1:24,000, 1995, CT DEP.
"Towns", scale = 1:24,000, 1995, CT DEP.

Prepared by the Windham Region Council of Governments.
Map is for general planning purposes only and is not intended for site specific review.

Plan of Conservation and Development
April 2006

4000 0 4000 Feet

Map 5

Although the planning effort began in the second half of 2012, the town's Planning and Zoning Commission has already begun reviewing potential methods of mitigation for induced development in Mansfield. In spring 2012, the Planning and Zoning Commission was presented with a variety of options for regulating development along potential water supply extensions. Three options were generally considered: allow the underlying zoning to guide development, amend the regulations to reference the state's Conservation and Development Policies Plan, or develop an overlay zone. The first option was believed to fall short of providing strong protections. The second option was not favored by the commission and town staff because it would have required references to the state's plan, which is being updated with an uncertain timetable. The third option was deemed most acceptable. The commission's Regulations Review Committee will be reviewing methods of adopting an overlay zone during autumn 2012.

The Town of Mansfield anticipates that the overlay zone, as developed and reviewed, will be consistent with the broader planning effort that will continue through 2015. Specifically, the rewritten zoning regulations will incorporate the overlay zone, and the updated *Plan of Conservation and Development* will include policies, goals, and objectives that steer development to appropriate areas and away from the water mains that traverse areas that are currently designated as Rural, Conservation, and Preservation areas on the State Plan.

Although the associated text has not been developed, the intent of the regulations for the overlay zone is to allow subdivision of land in accordance with the underlying zoning. However, the number of lots or units permitted by the Planning and Zoning Commission will be only as many as could be developed if the lots were reliant on installation of individual private wells in combination with septic systems (for those areas outside sanitary sewer service) or in combination with sewers (for those areas in sanitary sewer service areas). The commission will consult with the Eastern Highlands Health District for a determination.

Town of South Windsor

South Windsor prepared and adopted its *Plan of Conservation and Development* in 2002. The plan calls for the continued residential character of the town with balanced growth focusing on residential and nonresidential development. Four parcels adjacent to Interstate 84 in the extreme southeast corner of the Town of South Windsor are identified in the town's plan as available for industrial development. The Gerber Coburn Optical building is located on one of the parcels and is visible to many who travel on Interstate 84. Residentially zoned and residential developed land is located adjacent to the four parcels. The residential area and the Gerber parcel are already served with public water supply from CWC.

Town of Tolland

The Tolland *Plan of Conservation and Development* was amended in 2009 and underscores the community's desire to protect natural resources while simultaneously creating a Town Center to improve quality of life for residents. The envisioned Town Center is planned for the area roughly a mile in either direction along Route 195 from its interchange with Interstate 84.

Figure 4.1-6 shows Tolland's Future Land Use Plan from its *Plan of Conservation and Development*. One of the alternative connection routes begins at Route 195 and Anthony Road in Tolland and runs south along Route 195. According to the Future Land Use Plan, the majority of this route is designated for Low Density Residential development. There is an existing Multi-Family Residential Development (Norwegian Wood) indicated on the map on the easterly side of Route 195, south of Walbridge Hill Road, with protected open space located around that development. The only high priority conservation land identified is a small parcel on the westerly side of Route 195 on the town boundary with Coventry. A Primary Greenway is also identified running along the western side of the Willimantic River.

The commercial/industrial park located on the north side of Interstate 84 is designated for commercial and industrial use as is a small parcel on the southeast corner of Interstate 84 and Reed Road. At the other end of Interstate 84, mixed-use is designated for the region around the Route 195 interchange. In between, land is designated as low-density residential, open space, institutional (the existing ball fields), and natural resources.

Town of Vernon

The Vernon *Plan of Conservation and Development* was adopted in November 2011 and became effective in January 2012. Goals for residential and business development include:

- Protect residential neighborhoods
- Maintain overall residential density patterns
- Ensure multifamily development occurs in appropriate areas and contributes to community structure
- Increase homeownership opportunities
- Update commercial zones
- Maintain Vernon Circle as a regional destination
- Encourage appropriate business development at Exits 66 and 67
- Retain businesses and promote business development

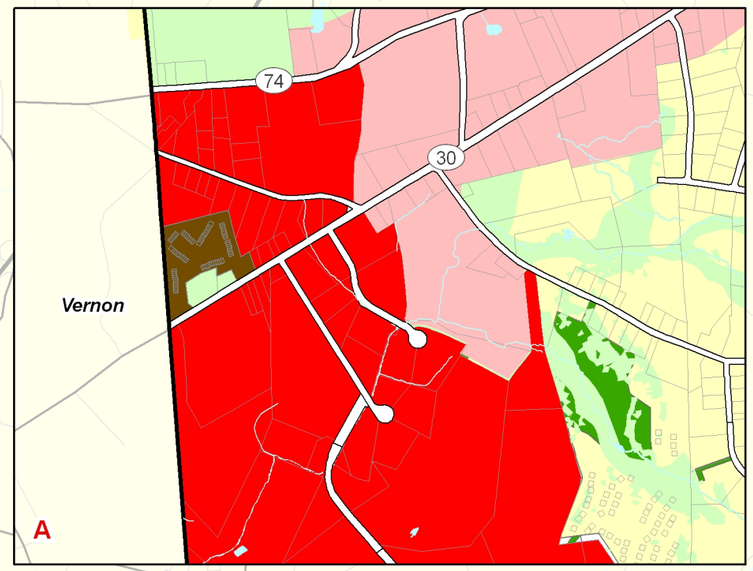
The plan notes that over time businesses located along key roads linking to Interstate 84 and business parks were created in these areas. The Business Development Plan (map) identifies Vernon Circle, an Exit 66 Opportunity Area, and an Exit 67 Opportunity Area along Interstate 84. The Future Land Use map identifies commercial, industrial, institutional, residential, and open space areas along Interstate 84.

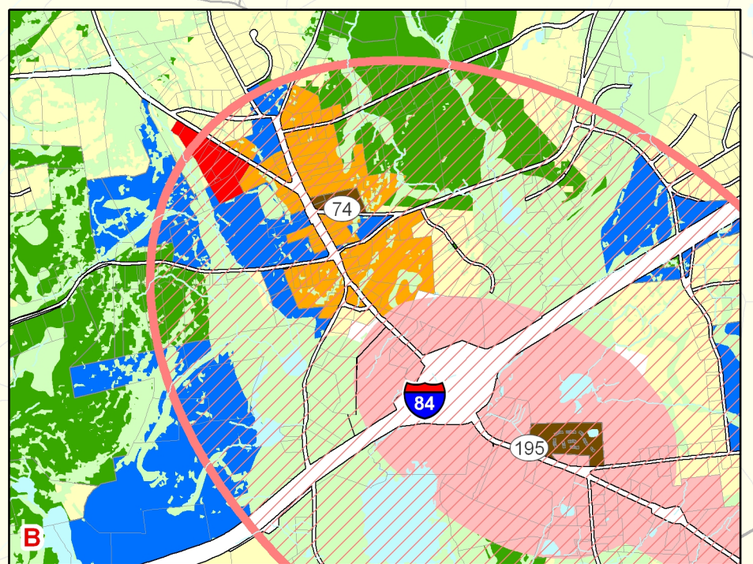
Two State Plan-designated Conservation Areas on the south side of Interstate 84 are considered separately and with an additional level of detail as follows:

- The easternmost of the two designated Conservation Areas is bounded by Bamforth Road on the west (approximately) and the former New England Sportsplex on the east. The former New England Sportsplex is visible from Interstate 84 and is located within the designated Growth Area. This relatively long span of land located in the state-designated Conservation Area is completely zoned R-27 (residential) and includes a few residential lots. However, it is mostly occupied by designated open space.

Future Land Use Plan

Tolland, CT





Ellington
140
30
Shenipsit Lake
Mountain
Shenipsit
Snipsic
East
30
A
B
Reservoir
Vernon
31
74
195
84
32
Pinney
Coventry
Bolton
3,000
Feet
Parcel data - February 2008.

Legend

Natural Resources
- Natural Resources
- Water

Open Space / Institutional
- Open Space
- Community Facility / Institutional

Residential
- Low Density Residential
- Multi-Family / Moderate Density Residential
- Village Center

Business and Other
- Commercial & Industrial
- Mixed Use
- Town Center

- The westernmost of the two designated Conservation Areas is bounded by Tunnel Road on the west and Bolton Road on the east. This area is locally zoned for commercial (C) and industrial (I) land uses and has excellent highway access via South Frontage Road. The Ron-a-Roll roller skating rink is located in this area and is highly visible from Interstate 84. The Vernon *Plan of Conservation and Development* designates this area as the Exit 66 Opportunity Area noted above, and the town desires commercial development in this location. Consistent with the Vernon plan, the Capital Regional Plan of Conservation and Development depicts this area as designated for Middle Intensity Development. The Vernon plan notes that the State Plan and its own plan are inconsistent in this location and states that *"The Vernon POCD is generally consistent with the State Plan map with one exception. This POCD supports continued business development adjacent to Interstate 84 in the Exit 66 area and supports extending sewers to this business area. The State Plan labels this area as Preservation and Conservation, likely due to the water resources located here. The Town should work with the State to determine options that will protect these water resources while allowing compatible development."*

In summary, commercial development is already present, and additional development is desired at the Exit 66 Opportunity Area. The Town of Vernon may wish to correct the conflict between the State Plan and Vernon's *Plan of Conservation and Development*.

4.1.4 UNIVERSITY LAND USE PLAN

The University's Storrs Campus Master Plan was completed in January 2006. Recent updates include athletic and landscape master plans. The master plan identifies the following planning principles and goals:

Planning Principles

- Respect what is already in place.
- All campus elements must interrelate.
- Campus is about people, not just buildings and spaces.

Planning Goals

- Establish a clear organizational concept.
- Develop an articulated hierarchy of spaces and paths.
- Create a humane campus in scale, function, and materials.
- Provide a flexible framework to accommodate future University needs.
- Articulate a plan of conservation and development.
- Identify opportunities for accommodating 21st Century UConn projects within the fabric of campus. Priorities include: enhancing academic facilities, additional research facilities, consolidating the now scattered fine arts facilities into a single Fine Arts Complex, the North Hillside Road extension to Route 44, and residential and student life enhancements.
- Project campus space capacities for meeting future programmatic needs.
- Develop environmentally sustainable design guidelines for consideration in future project implementation.

In particular, the planning goals related to providing a flexible framework to accommodate future University needs, enhancement of 21st Century UConn projects, and the use of environmentally sustainable design guidelines are pertinent to the subject EIE and the eventual selected project.

4.1.5 LOCAL ZONING

Zoning among the potentially affected communities varies widely from rural residential to commercial and industrial uses. All potentially affected communities support economic development in specified areas through commercial, business, and/or mixed-use zoning. These commercial development zones are generally located along major state arterials in the area (Routes 32, 44, and 195) and at existing development nodes.

Bolton

Revised Zoning Regulations were adopted in Bolton and became effective on July 1, 2012 to facilitate the development desired along Route 44. The zoning map is in the process of being amended and has not been published as of summer 2012. According to the prior zoning map, parcels adjacent to Route 44 are zoned Residence 1 and 3 (R-1 and R-3), Industrial (I), General Business (GB), Rural Mixed Use Zone (RMUZ), and Gateway Mixed Use Industrial Zone (GMUIZ). Parcels adjacent to I-84 are zoned R-1 except for a small area of R-2 zoning and an expanse of GB zoning on the north side of the highway east of Williams Road.

The updated zoning regulations allow the following in R-1 and R-2 zones: single- and two-family dwellings, parks, farming, municipal facilities, churches, private schools, child care facilities, and continuing care facilities for adults (not more than four units per acre). Multiple-dwelling complexes are not allowed in R-1 zones but are allowed in R-2 zones. These two zoning classes are believed to be somewhat protective against intense development that could be induced by the availability of a public water supply system. The I, GB, RMUZ, and GMUIZ districts are all compatible with more diverse development that could occur along Route 44 with the availability of sewers.

Coventry

Zoning in Coventry is generally consistent with the special planning areas and the preservation focus areas. The portions of Special Planning Area 1 and Special Planning Area 2 on the south side of Route 44 are zoned Commercial/Agricultural (C/A), as is the southwest corner of Special Planning Area 3. The C/A zones were established in 2006 and are roughly coincident with the preservation focus areas described above.

The remaining parcels in each of these three special planning areas are zoned Commercial (C) and Professional Office (PO). All remaining land along Route 44 is zoned General Residential Zone 80 (GR-80, west of the Grant Hill Road/Main Street intersection and east of that intersection on the north side of Route 44) and General Residential Zone 40 (GR-40, east of the Grant Hill Road/Main Street intersection on the south side of Route 44).

Section 6.06 of the Zoning Regulations provides the following guidance for C/A zoning:

- Uses Not Requiring Site Plan Review by the Commission – The following uses are permitted in the Commercial/Agricultural Zone upon the issuance of a zoning permit by the Zoning Agent:

    1. Agriculture on a lot containing a single-family or two-family dwelling, or on a lot or lots adjacent to, and under the same ownership as, a lot containing a single-family or two-family dwelling….
    2. Sales of agricultural products grown on the premises

- Uses Requiring Site Plan Review by the Commission – The following uses are permitted in the Commercial/Agricultural Zone upon the issuance of site plan approval by the Commission:

    1. Historic sites and monuments that are open to the public, with or without an entrance fee
    2. Tourist homes or bed-and-breakfast facilities
    3. Agricultural show areas
    4. Riding; carriage, wagon, and sleigh rides; boarding and instructional activities related to the keeping of horses
    5. Storage and repair of farm vehicles and similar agricultural equipment, not to include operation of a repair garage for other motor vehicles
    6. Greenhouse/nursery

- The Commission may issue a special permit for the following uses in the Commercial/Agricultural Zone:

    a. Philanthropic, educational, religious, cemetery, and charitable uses
    b. Fairgrounds
    c. Bazaars, festivals, auctions, carnivals, circuses, and other, similar, temporary activities
    d. Housing, camps, and dormitories for seasonal farm workers….
    e. Storage, packaging, processing, and bottling of farm products
    f. Retail trade, up to 7,500 square feet of gross building floor area per lot
    g. The raising of animals other than common domestic household pets….
    h. Feed and grain stores and tack shops
    i. Retail sales of farm products
    j. Farm stores, provided the majority of the products sold are agricultural and not including manufacture of farm equipment
    k. Veterinary clinics
    l. Construction and sale of agricultural and livestock-related products, including but not limited to troughs and jumps
    m. Wineries

The Zoning Regulations require "design guidelines" for the C/A zone. Specifically, "*the Commission shall consider, when reviewing site plans and special permit applications for property within the C/A Zone, the 'Coventry Design Guidelines for Commercial Development' developed by the Green Valley Institute and dated September 24, 2010 and effective October 12, 2010, in rendering its decision on an application for either new construction; modifications to an existing building that would result in an increase of 25% or more in the surface area of the*

exterior of the building; or modifications to an existing structure that would result in an increase of 25% or more in the footprint area of the structure."

Section 6.07 of the Zoning Regulations provides guidance for C zoning districts. The C zoning allows a multitude of commercial uses through zoning permit, site plan review, or special permit procedures. The design guidelines described above (Coventry Design Guidelines for Commercial Development) are incorporated into this section of the regulations.

Section 6.13 of the Zoning Regulations provides guidance for PO zoning districts. The PO zone allows professional offices, one- or two-family dwellings on the same lot as a professional office, and child or adult day care facilities. The design guidelines described above (Coventry Design Guidelines for Commercial Development) are incorporated into this section of the regulations.

Section 6.03 of the Zoning Regulations provides guidance for GR-40 and GR-80 zoning. Single- and two-family dwellings, agriculture, parks, municipal facilities, nurseries, greenhouses, tourist facilities, inns, golf courses, hospitals, sanitariums, rest homes, convalescent homes, day care facilities, veterinary hospitals, and "Designed Apartment/Condominium Developments" are all allowed by zoning permit, site plan approval, or special permit. Section 5.13 of the Zoning Regulations articulates the intent and requirements for Designed Apartment/Condominium Developments:

> *The intent of this section is to provide an opportunity for the construction of a variety of housing types in Coventry to meet varying life styles, family sizes and income levels; to provide for apartment developments which are compatible with the character of the town and existing neighborhoods; to allow apartment developments on those tracts of land which, by reason of topography, favorable soil conditions, adequate road access and neighborhood character, are favorable to accommodating such clusters; and to encourage an aesthetically pleasing complex of multi-family units. Designed Apartment/Condominium Developments may be approved by special permit in the zones specified in Article VI, provided, however, that no such permit shall be issued for any such development in the drainage basin (watershed area) of Coventry Lake (Wangumbaug Lake).*

The C/A zoning class is consistent with the town's designated preservation focus areas, generally consistent with the State Plan designations, and believed to be protective against intense development that could be induced by the availability of a public water supply system. However, the C, PO, GR-40, and GR-80 classes have a variety of allowances that make them less protective and could possibly allow intense development when parcels in the districts are exposed to a new water supply main.

<u>*Route 195 Corridor*</u> – The boundaries of Special Planning Area 7 are coincident with the small block of land zoned Neighborhood Commercial (NC). The NC zone was established in 2006 and is bounded by the Tolland town line to the north. General Residential Zone 80 (GR-80) is located to the south and west, and River/Aquifer zoned land (RAZ) is located to the east along the Willimantic River. Section 6.12 of the Zoning Regulations provides the following guidance for NC zoning:

- Uses Not Requiring Site Plan Review by the Commission – Single-family dwellings are permitted in the Neighborhood Commercial Zone upon the issuance of a zoning permit by the Zoning Agent.

- Uses Requiring Site Plan Review by the Commission – The following uses are permitted in the Neighborhood Commercial Zone upon the issuance of site plan approval by the Commission:

    1. Retail trade, with less than 5,000 square feet of gross building floor area per lot
    2. Personal services

- Section 6.12.02 Specially Permitted Uses – The following uses are allowed by special permit in the Neighborhood Commercial Zone:

    1. Retail trade, with 5,000 or more square feet of gross building floor area per lot
    2. Professional services
    3. Offices
    4. Restaurants
    5. Studios for the creation, preparation, exhibition, demonstration, and/or sale of photography, sculptures, paintings or other artwork, and/or crafts, but without artistic instruction or lectures

The Zoning Regulations require "design guidelines" for the zone. Specifically, "*the Commission shall consider, when reviewing site plans and special permit applications for property within the NC Zone, the 'Coventry Design Guidelines for Commercial Development' developed by the Green Valley Institute and dated September 24, 2010 and effective October 12, 2010, in rendering its decision on an application for either new construction; modifications to an existing building that would result in an increase of 25% or more in the surface area of the exterior of the building; or modifications to an existing structure that would result in an increase of 25% or more in the footprint area of the structure*."

The Coventry *Plan of Conservation and Development* and zoning map are in conflict with the State Plan and the WinCOG land use plan where Route 195 traverses the town. The town appears to desire development at Route 195 and has provided the NC district to enable such development.

The GR-80 zone is located west of Jones Crossing Road. Specifically, a 60.9-acre parcel is located in this zone west of the road. The GR-80 zone allows several business uses by special permit, as well as allowing Designed Apartment/Condominium Developments including but not limited to senior housing.

The RAZ district spans the remaining distance from the NC zone to the Willimantic River. This zoning class allows mainly agricultural and rural residential uses although there are provisions for philanthropic, educational, religious, cemetery, and other charitable uses. The RAZ is considered suitably protective for preventing intense development near the river.

Manchester

Numerous zoning districts are present in the town of Manchester, and a total of 16 districts lie along I-84 and I-384:

- Residential
  - Rural Residence
  - Residence AA
  - Residence A
  - Residence B
  - Residence C
  - Planned Residential Development
  - Elderly Housing Development

- Non-Residential and Mixed
  - General Business
  - Business 1
  - Business 2
  - Business 5
  - Industrial
  - Comprehensive Urban Development
  - Special Design Commercial
  - Historic

Given the number and variety of zoning districts in Manchester and the developed nature of most of them, a lengthy discussion of the intent of each is not warranted in this document. Public water service provided by the Town of Manchester is already provided throughout most of these zoning districts, and even the districts with many private individual wells (such as Rural Residence) have several neighborhoods with public water service.

Mansfield

The various pipeline routes through Mansfield would primarily pass through Rural Agricultural Residence 90 Zones (RAR-90). However, there are several small areas of other zoning districts as well. For the northern Metropolitan District Commission (MDC) and CWC connections, the potential route running the length of Route 195 to the campus passes through a small Neighborhood Business 1 Zone (NB-1) and by two small Professional Office 1 Zones (PO-1), a Planned Business 3 (PB-3) Zone, a Residence 90 (R-90) Zone, and a Research and Development Limited Industrial Zone (RD/LI). The Baxter Road alternative interconnection route to CWC passes through the same small NB-1 Zone and by a small PO-1 Zone. It otherwise would cross RAR-90 land. The potential route off Route 44 and along an extended North Hillside Road would traverse the same lands as the Route 195 alternative though it would cross more of the RD/LI.

The potential connection route for WWW or new wells running north along Route 195 would also pass through largely RAR-90 Zones and very small pockets of NB-2 in Mansfield Center; PO-1 in Mansfield Center, Spring Hill, and Storrs Center; NB-1 in Spring Hill; and a small Business Zone near Storrs Center. Potential connection routes to Mansfield Hollow wells could

alternatively pass through RAR-90 lands along Chaffeeville, Mulberry, and Gurleyville Roads. The potential pipeline along South Eagleville Road would pass by R-90 land and a Design Multiple Residence (DMR) Zone.

Permitted Uses in the Mansfield Zoning Districts identified above are listed below.

Rural Agricultural Residence 90 (RAR-90; lot size generally 90,000 sf)

- One single-family dwelling
- One two-family dwelling per 120,000 square foot lot
- One single-family dwelling with one efficiency dwelling unit
- Hospitals, sanitariums, nursing homes, convalescent hospitals, and other residential treatment facilities
- Community residences for mentally retarded persons or childcare residential facilities
- Community residences for mentally ill adults
- Group homes
- Churches or other places of worship
- Schools, libraries
- State-licensed group day care homes
- Recreational uses such as golf courses, cross-country skiing facilities, or day camps
- Reservoirs, sewage treatment plants, and related facilities
- Cemeteries
- Agricultural uses

Residence 90 (R-90; lot size generally 90,000 sf)

- One single-family dwelling
- One single-family dwelling with one efficiency dwelling unit
- Cemeteries
- Community residences for mentally retarded persons or childcare residential facilities for children with mental or physical disabilities
- State-licensed group day care homes

Design Multiple Residence (DMR)

- One-family, two-family, and multifamily dwellings
- State-licensed group day care homes or state-licensed child day care centers

Planned Business 3 (PB-3)

According to the Regulations, with commitment to provide public water and sewer to this area, the following list of permitted uses will be re-evaluated:

- Retail uses
- Banks
- Professional offices and personal services

- Repair services or business (bicycles, radios, televisions, home appliances, office equipment, computers, watches, clocks, shoes, and similar uses)
- State-licensed group day care homes
- Commercial printing or production
- Commercial recreation facilities
- Game arcades as a primary (more than 3 games) and not accessory use
- Automobile sales
- Automotive service stations and garages
- The sales, service, and repair of motorcycles and small internal combustion engines
- The use of live music associated with any hotel, motel, restaurant, or commercial recreation facility
- The sale of alcoholic liquor
- Restaurants
- Hotels, motels, tourist homes
- Adult-oriented establishments

Research and Development Limited Industrial (RD/LI)

- Research and development laboratories and related facilities
- Commercial printing and reproduction services and other industrial production, processing, assembly, and/or distribution of products
- Hotels, conference centers, with accessory commercial uses
- Business and professional offices
- Public or private educational facilities and uses
- State-licensed child day care centers
- Recreational facilities, such as tennis, racquetball, and fitness clubs
- Parking garages
- Radio, television, and other communication facilities
- The use of live music within the building confines of any hotel or restaurant
- The sale of alcoholic liquor associated with a permitted restaurant, hotel, or commercial recreation facility
- Agricultural and horticultural uses
- Dwelling units for caretaker/security personnel

Neighborhood Business 1 (NB-1)

- Retail stores
- Banks
- Professional offices and personal service uses
- Repair services or businesses
- State-licensed group day care homes or state-licensed child day care centers
- Commercial recreation centers
- Tourist homes
- Mixed-use projects consisting of one or two residential dwelling units as part of a commercial building
- The sale of alcoholic liquor

- Restaurants
- The use of live music within the building confines of any restaurant

Neighborhood Business 2 (NB-2)

- Retail uses
- Banks
- Professional offices and personal service uses
- Repair services or businesses
- State-licensed group day care homes or state-licensed child day care centers
- Commercial recreation centers
- Tourist homes
- Mixed use projects consisting of one or two residential dwelling units as part of a commercial building
- The sale of alcoholic liquor
- Place of assembly-banquet hall

Professional Office 1 (PO-1)

- Offices for medical, legal, real estate, insurance, financial, engineering, architectural and counseling services; offices for educational, charitable, and civic organizations; and other office uses of a similar nature
- One dwelling unit provided it is on the same property as a professional office
- State-licensed group day care homes or state-licensed child day care centers

Business

- Retail uses
- Banks
- Professional offices and personal services
- Repair services
- Schools, libraries
- State-licensed group day care homes or state-licensed child day care centers
- Commercial printing or production
- Commercial parking lots
- Commercial recreation facilities
- Game arcades as a primary (more than 3 games) and not accessory use
- Automotive sales
- Automotive service stations and garages
- The sales and repair of motorcycles and small internal combustion engines
- Restaurants
- Dry cleaning establishments
- Hotels, motels, tourist homes
- Boarding houses, fraternity and sorority houses
- The use of live music within the building confines of any hotel, motel, and restaurant
- Expansions of existing mobile manufactured housing parks

As noted above, the Town of Mansfield has embarked on a program to update its *Plan of Conservation and Development* and develop new land use regulations, including zoning regulations. Many of these districts are likely to change in location, intent, and/or allowable uses.

South Windsor

Four parcels zoned for Industrial use are adjacent to Interstate 84 in the extreme southeast corner of the town of South Windsor. The parcels are identified in the town's *Plan of Conservation and Development* as available for industrial development. Gerber Coburn Optical is located on one of the parcels and is visible to many who travel on Interstate 84. Residentially zoned and residential developed land is located adjacent to the four parcels. The residential area and Gerber are already served with public water supply from the CWC.

Tolland

From the Vernon town line to Route 195, zoning along I-84 varies from Commercial/Industrial (CI) Zone A and "Tolland Business Park" (TBP) at the west end to "Tolland Village Area" (TVA) and "Gateway Design District" (GDD) zoning at the Route 195 interchange. In between, most of the land adjacent to the highway is zoned Residential Design District (RDD) and "RDD-Natural Resource and Wildlife Protection Area." A small parcel at the southeast corner of Interstate 84 and Reed Road is zoned C/I but surrounded by RDD zoning.

The purposes of these diverse zoning districts are defined in the Zoning Regulations:

- Residential Design Districts – The purposes of the regulations in the Residential Design District are the following; minimum lot size is generally two acres.
    - Encourage flexibility of site design and housing construction which will provide for a variety of housing opportunities and amenities to meet community needs, including single-family, multi-family, village type cluster, and affordable housing.
    - Promote the most appropriate use of the land, considering its particular topography, size, shape, soils, natural features, historic assets, and other similar features.
    - Preserve wetlands and otherwise control new developments so as to minimize hazards resulting from stormwater runoff, stream flooding, and erosion through the implementation of Low Impact Development strategies.
    - Protect the natural scenic, semi-rural character and ecologically important features of the town's remaining undeveloped land.
    - Provide the maximum land area for open space and park and recreation purposes, including trails.
    - Provide greater protection in the Natural Resource & Wildlife Protection Areas by protecting large blocks of diverse contiguous land; protecting critical stream corridors to protect and enhance surface water and groundwater quality and to provide important connections in the life-cycles of wildlife; and keeping watersheds intact to provide the greatest diversity of wildlife resources.
- Commercial/Industrial – The purpose of the Commercial/Industrial Zones is to provide for larger scale, more intense commercial and light industrial uses.

- Tolland Business Park Zone – The purpose of the Tolland Business Park Zone is to provide for light industry, offices, and other suitable uses that allow for flexible site development while retaining the natural site features and encouraging sound and aesthetically pleasing commercial and industrial development.

- Tolland Village Area – The purpose of the Tolland Village Area is to expand economic development and housing opportunities at the Interstate 84 interchange in Tolland with architecture and land use patterns that are reflective of a traditional New England village.

- Gateway Design District – The purpose of the Gateway Design district is to create an attractive entrance to Tolland while encouraging coordinated commercial/office development with higher design standards at the interchange gateway entrances to the community. The goal is to promote compact commercial development having scale and form consistent with the natural landforms of the site and character of the town.

Zoning and proposed future land uses are congruent at the local level. The commercial/industrial park located on the north side of Interstate 84 in the C/I and TBP districts is designated for commercial and industrial use as is a small parcel on the southeast corner of Interstate 84 and Reed Road. At the other end of Interstate 84, mixed-use is designated for the region around the Route 195 interchange. In between, land is designated as low-density residential, open space, institutional (the existing ball fields), and natural resources.

The CWC currently provides public water service to the commercial/industrial park located on the north side of I-84 in the C/I and TBP districts. Public water service is not currently available in the RDD and RDD-Natural Resource and Wildlife Protection Area districts located on the north and south sides of Interstate 84 between the existing commercial/ industrial park and the Route 195 interchange. These areas are not particularly at risk for induced development due to existing low-density residential uses, steep slopes, extensive wetlands, and the limited roadway networks available.

The state-designated Rural Community Center lying along Route 195 from the Tolland Green to Anthony Road is comprised of a GDD zoning district near Interstate 84 and NC zoning from the vicinity of Goose Lane to Anthony Road. From Anthony Road to the Coventry town line, Route 195 traverses a more rural area with RDD and RDD-Natural Resource and Wildlife Protection Area zoning. The purposes of these zoning districts are defined in the Zoning Regulations (two were defined above, and the remaining one is defined below):

- Neighborhood Commercial - The purpose of the Neighborhood Commercial Zone is to provide for smaller scale, less intense commercial/office uses which will serve as a transition to residential areas.

Public water service provided by the Town of Tolland is already available on Anthony Road and the portion of Route 195 northwest of Anthony Road. Public water service is not currently available in the RDD and RDD-Natural Resource and Wildlife Protection Area districts located southeast of Anthony Road, and these areas have risk for induced development if a water main were to become available with excess capacity.

Vernon

Numerous zoning districts are present in the town of Vernon. The following districts lie along I-84:

- Single-Family Residential R-27
- Planned Residential Development
- Commercial
- Industrial
- Special Economic Development
- Planned Development - Exit 67

The wide variety of zoning districts along I-84 is consistent with the full range of land uses desired along the highway and noted on the Future Land Use map described above: commercial, industrial, institutional, residential, and open space. Vernon's zoning is also consistent with the three special planning areas (Vernon Circle, Exit 66 Opportunity Area, and Exit 67 Opportunity Area). Public water service provided by the CWC is currently provided throughout most of these zoning districts, and even the districts with many private individual wells have several neighborhoods with public water service.

4.2 SOCIOECONOMICS

The following information regarding demographics, employment, and tax base has been obtained from Geographic Information System (GIS) and assessors' data and plans of conservation and development from potential project towns, the U.S. Census, WinCOG, and CRCOG. The following discussion is intended to provide an overall background of the demographic makeup of the study area.

4.2.1 DEMOGRAPHICS

The total population of potential project communities generally increased from 2000 to 2010. In particular, Mansfield grew by 6,000 people over the last decade (Table 4.2-1).

TABLE 4.2-1
Study Area Historic Population (1950-2010 Census)

Year	Bolton	Coventry	East Hartford	Manchester	Mansfield	South Windsor	Tolland	Vernon
1950	1,729	4,043	29,933	34,116	10,008	4,066	1,659	10,115
1960	2,933	6,358	43,977	42,102	14,638	9,460	2,950	16,961
1970	3,691	8,140	57,583	47,994	19,994	15,553	7,857	27,237
1980	3,951	8,895	52,563	49,761	20,634	17,198	9,694	27,974
1990	4,575	10,063	50,452	51,618	21,103	22,090	11,001	29,841
2000	5,017	11,504	49,575	57,740	20,720	24,412	13,086	28,063
2010	4,980	12,435	51,252	58,241	26,543	25,709	15,052	29,179

Sources: U.S. Census Bureau, Mansfield and Tolland Plans of Conservation and Development, Connecticut State Register and Manual

Table 4.2-2 shows Census 2000 and 2010 household size averages. Household sizes generally decreased slightly from 2000 to 2010; however, in Mansfield, household size actually slightly increased. Tolland has a significantly larger average household size than the state average.

TABLE 4.2-2
Average Household Size

Location	2000	2010
State of Connecticut	2.53	2.52
Bolton	2.63	2.60
Coventry	2.69	2.59
East Hartford	2.42	2.50
Manchester	2.32	2.32
Mansfield	2.40	2.44
South Windsor	2.71	2.58
Tolland	2.83	2.81
Vernon	2.26	2.22

Sources: 2000 Census Summary File 4; 2010 Census Summary File 2

The potential pipeline routes contain a variety of residential, commercial, municipal, institutional, agricultural, and light industrial uses. The extent of development in these areas is primarily rural to suburban although areas within East Hartford and Manchester have a higher percentage of urban uses. A variety of housing types and neighborhoods can be found throughout the area. It is notable that the more rural communities (Bolton, Coventry, and Tolland) have much higher average household sizes than the more developed communities, a characteristic indicative of a higher percentage of single-family homes over apartments or group quarters.

The United States Environmental Protection Agency (EPA) notes that Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. No group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or polices.

The EPA Environmental Justice Viewer provides demographic information by census block group based on 2010 census data. This viewer is located on the EPA website at (http://www.epa.gov/compliance/environmentaljustice/index.html). This information includes potential low-income or minority populations[1]. In general, potential pipeline routes pass through areas where less than 10% of the population are considered below the poverty line except for areas in East Hartford (pipeline segment 1 – less than 20%), Manchester (pipeline segments 2 and 3 – less than 20%), and much of Mansfield.

[1] Low income populations have a household income at or below thresholds determined by the U.S. Census Bureau determined based on individual household size and age of the members. Minority populations include persons who identify themselves as Black, Hispanic, Asian American, American Indian, Alaskan Native, or some combination thereof.

The northwestern Mansfield area is reported as having up to 40% of the population in the census tract below the poverty line. Several potential water main routes pass through this area. The census tract with the highest percentage of the population below the poverty line is located at the University (greater than 40%). The 2010 Mansfield Town Profile prepared by the Connecticut Economic Resource Center, Inc. (CERC) states that the 1999 poverty rate was at 14.2%, much higher than the poverty rates of Coventry (3.7%) and Tolland (2.2%). This is likely reflective of the large student population in Mansfield associated with the University who would be expected to have a much lower annual income compared to the nonstudent population. The population breakdown supports this assumption: 43% of the population of the town of Mansfield is between the ages of 18 and 24, much higher than the percentage of population for that age range in Coventry (7%) and Tolland (6%) and the statewide population (9%). In summary, the reliance on the census block as the unit of analysis is the reason for most of the Town of Mansfield located west of Route 195 appearing to be below the poverty level.

The census blocks with the highest percentages of minority populations are spread throughout the study area. Potential pipeline routes in East Hartford and Manchester pass by areas that are designated as more than 40% minority while pipeline routes in Vernon would pass by areas that are up to 40% minority. Areas in Bolton and South Windsor are reported as up to 20% minority, as is the Route 195 corridor in Tolland. Interstate 84 in Tolland and Route 44 in Coventry are both designated as areas with less than 20% minority population. The population in Mansfield is much more diverse than its neighboring communities: areas near the University are up to 30% minority while the area of the Depot Campus, Mansfield Depot, and the Route 32 corridor to Eagleville are denoted as more than 40% minority. The remainder of northwestern and western Mansfield is less than 30% minority, with areas near Mansfield Center being less than 20% minority.

4.2.2 ECONOMY AND EMPLOYMENT

All municipalities within the area analyzed are located in the Hartford Labor Market Area. The latest monthly employment figures for the Hartford region and those communities are shown in Table 4.2-3. The regional labor force totaled over 600,000. The unemployment rates in the majority of project communities were lower than the rate for the region.

TABLE 4.2-3
Average Employment by Civilian Labor Force (2011) for
Hartford Local Market Area and Project Towns

Local Market Area	Labor Force	Employed	Unemployed	Unemployment Rate
Hartford Local Market Area	607,802	544,216	53,586	8.8%
Bolton	2,988	2,782	206	6.9%
Coventry	7,281	6,707	574	7.9%
East Hartford	27,373	24,318	3,055	11.2%
Manchester	34,036	31,188	2,848	8.4%
Mansfield	14,215	13,154	1,061	7.5%
South Windsor	14,743	13,782	961	6.5%
Tolland	8,643	8,117	526	6.1%
Vernon	17,353	15,931	1,422	8.2%

Source: Connecticut Department of Labor

The towns of Bolton, Coventry, Mansfield, and Tolland are primarily residential communities with some areas of commercial development and minimal industry. In contrast, Vernon and Manchester have a greater variety of land uses, and South Windsor is somewhat intermediate in terms of land use. The Route 195 corridor in Tolland already has public water service in its commercially zoned area. Potential interconnection routes through the town of Coventry are primarily agricultural and residential in nature although small commercial developments are found along Route 44 in Coventry as well as Bolton. The majority of the proposed water main routes in Mansfield traverse residential areas, and potential well locations are also in residential or predominantly residential or undeveloped areas.

According to the *Regional Economic Development Implementation Plan* prepared by WinCOG in 2010, the economic development focus of Coventry is along Route 44 and in strengthening economic ties with the University. In Mansfield, economic development efforts are focused on Storrs Center and a few other commercial nodes. The Town of Tolland recently revised its Plan of Conservation and Development and enacted new zoning regulations to focus economic development efforts on a mixed-use Town Center located on the north side of the Interstate 84 and Route 195 interchange. This economic development area is outside of the EIE study area. The towns of Bolton, Coventry, Tolland, and Mansfield have the potential for commercial and residential development in conjunction with proposed water mains.

University of Connecticut Development

As stated in the Final Environmental Impact Statement (FEIS) for the Technology Park, the proposed North Campus development will provide many high-technology employment opportunities. The North Campus development is anticipated to generate approximately 2,800 new jobs over a 20-year period. These jobs would primarily fall within the North American Industry Classification System (NAICS) sector of professional, scientific, and technical services, the sector that has the highest average annual wage of all NAICS sectors represented in Mansfield.

According to 2009 demographic data compiled by the University and reported in the FEIS, approximately 25% of University employees reside in the town of Mansfield while approximately 85% of all University employees reside within a 30- to 40-mile radius of the Main Campus. As such, these new jobs are expected to attract workers who will live in an approximately 30- to 40-mile radius of the Main Campus, and the new jobs created by the North Campus development are expected to increase demand for existing and new housing.

In addition, the construction of research and technology facilities on the North Campus site is expected to benefit the overall amount and quality of research performed at the University. This benefit, in turn, is expected to increase research grant funding; help to attract and retain high-quality faculty, staff, and graduate students; strengthen the University's position as a research and technology center; and provide a productive research hub for the Governor's Bioscience Connecticut initiative. Secondary benefits are also expected in the region providing supplies to support research activities.

The construction of North Campus facilities will cause the relocation of existing agricultural activities to the Depot Campus. Existing forest areas will likely be cleared to support the

agricultural relocation. Construction of new housing has the potential for secondary and cumulative impacts to all resources evaluated in this EIE.

Long term, the University is planning to redevelop its Depot Campus on Route 44 with additional research and education facilities. No information is currently available regarding specific projects, but these projects will generate additional employment and secondary benefits in the region.

Town of Mansfield Development

The Storrs Center development is a mixed-use town center and main street corridor currently under construction at the south end of the Main Campus on Route 195. This development is expected to create 174 jobs in Phase 1A and Phase 1B of construction, with additional job opportunities created by full buildout in 2030.

No potential job creation statistics have been developed for Mansfield Four Corners redevelopment but, as a mixed-use area, it is expected that the redevelopment will create both jobs and additional housing in that area of Mansfield. Some existing jobs could be displaced as a result of redevelopment activities.

The town of Mansfield has several other areas that are planned development areas as identified in the 2006 *Plan of Conservation and Development* that could benefit as a result of the proposed project. The area in the vicinity of the intersection of Route 32 and Route 195, Mansfield Depot, and Mansfield Center each are delineated as Neighborhood Business/Mixed Use zones. While commercial uses would be less in these areas over other business districts, public water service would help support the full utilization of these business areas.

The town of Mansfield would benefit from the increased tax income resulting from private developments on the University or within the town of Mansfield. In general, developed and redeveloped properties have a higher assessed value than undeveloped, vacant, or abandoned properties.

Town of Coventry Development

The Storrs Community Church has recently been built on Route 195 in Coventry. A parcel across Route 195 to the southwest is zoned for commercial development. In the past, a hotel has been identified for this site. A development in this area could potentially be served by public water. Details regarding the size of a development and the number of employees are not currently available.

Town of Tolland Development

No major developments are known to be planned in Tolland within the potential study area. A few commercially zoned properties are currently for sale along Route 195 in the area of the existing water system but are not connected to any specific project proposal. No known developments are proposed along new pipeline routes.

4.2.3 EXISTING WATER RATES

The extension of public water supply would result in new customers who would pay for water service. For the purpose of this analysis, current water rates were held constant. CWC, MDC, WWW, the Town of Tolland, and the University are the major public water systems evaluated in this EIE. Water rates for private water companies (such as CWC) have been reviewed and approved by the Public Utility Regulatory Authority (PURA), an agency of the Connecticut Department of Energy & Environmental Protection (CT DEEP). The University is not considered to be a public water company under current legal definition and is therefore not subject to PURA review or approval for its water rates. Municipal water utilities such as MDC, the Town of Tolland, and WWW are also not regulated by PURA. Current water rates for each of the systems are presented below.

- CWC: CWC last updated its water rates for its Northern Operations Western System in July 2010. CWC's water rates consist of a Basic Service Charge (for being connected to the water system) and a flat Commodity Charge (for actual consumption of water). The basic service charge is based on meter (connection) size; a 5/8-inch diameter meter is typically used for residential connections. The commodity charge is a flat rate based on customer class (residential, commercial, etc.). CWC also charges for public and private fire protection services (hydrants, etc.) and for other service-related fees.

  - Basic service charge: A 5/8-inch meter connection costs $9.61 per month.
  - Commodity charge (Residential): $5.491 per 100 cubic feet
  - Commodity charge (Commercial): $4.806 per 100 cubic feet
  - Commodity charge (Industrial): $4.087 per 100 cubic feet
  - Commodity charge (Public Authority): $4.507 per 100 cubic feet
  - Public fire protection charges: $17.45 per hydrant per month; $0.08840 per linear foot per month

- MDC: MDC last updated its water rates in January 2012. MDC's water rates consist of a Customer Service Charge (for being connected to the water system) and a flat Commodity Charge (for actual consumption of water) regardless of customer type. The basic service charge is based on meter (connection) size. MDC does not charge for public fire protection but does impose an additional surcharge in nonmember towns based on meter size.

  - Basic service charge: A 5/8-inch meter connection costs $13.10 per month.
  - Commodity charge: $2.43 per 100 cubic feet
  - Nonmember surcharge: A 5/8 meter connection in a nonmember town costs an additional $13.18 per month.

- WWW: WWW last updated its water rates in July 2007. WWW water rates consist of a Basic Service Charge (for being connected to the water system) and a Commodity Charge (for actual consumption of water). The basic service charge increases with increasing connection size. The commodity charge is a flat rate based on the town of use. Charges are higher in Mansfield than they are in Windham. WWW also charges for fire protection services based on hydrant or sprinkler system size.

  - Basic service charge (Mansfield): $9.65 per month

- Commodity charge (Mansfield): $2.65 per 100 cubic feet
- Hydrants (Mansfield): $34.66 per hydrant per month

- Town of Tolland: The Tolland Water Commission last updated its water rates in January 2011. Tolland's water rates consist of a Basic Service Charge (for being connected to the water system) and a Commodity Charge (for actual consumption of water). The basic service charge is flat for all meter sizes. The commodity charge uses an inclining block rate structure per quarter for all customer classes, which means that beyond certain usage thresholds increments of water become more expensive. The Town of Tolland does not charge for fire protection services.

  - Basic service charge: A 5/8-inch meter connection costs $6.90 per month.
  - Commodity charge (0-1,099 cubic feet): $2.80 per 100 cubic feet
  - Commodity charge (1,100-2,099 cubic feet): $3.75 per 100 cubic feet
  - Commodity charge (2,100-3,599 cubic feet): $4.70 per 100 cubic feet
  - Commodity charge (3,600-5,099 cubic feet): $5.70 per 100 cubic feet
  - Commodity charge (over 5,100 cubic feet): $6.00 per 100 cubic feet

- University of Connecticut: The University last updated its water rates in 2006. The University's water rates consist of a Basic Service Charge (for being connected to the water system) and a Commodity Charge (for actual consumption of water). The basic service charge is flat for all meter sizes, and the commodity charge is also a flat rate for all customers.

  - Basic service charge: $8.33 per month
  - Commodity charge: $3.05 per 100 cubic feet

PURA uses an annual household consumption value of 96 hundreds of cubic feet (hcf), or approximately 72,000 gallons, for comparison of residential water rates. Water rates for other customer classes can vary widely based on the type of use. Table 4.2-4 presents a comparison of potential water rates for residential and commercial customers using the PURA annual household consumption value. For this analysis, commercial customers are assumed to consume an equal amount of water as residential customers, and the estimates include any applicable service charges (though not initial construction and connection fees which would be borne by the consumer).

TABLE 4.2-4
Summary of Average Annual Water Costs to Customers

Public Water System	Residential	Commercial
CWC	$643	$577
MDC	$549	$549
WWW	$371	$371
Town of Tolland	$413	$413
University of Connecticut	$393	$393

Sources: CWC website, MDC Website, WWW, Tolland Water Commission, University of Connecticut, Tighe & Bond

Note: Tolland rates assume that an equal amount of water is used each quarter.

As shown in Table 4.2-4, CWC has the highest annual customer water rates of the five water utilities evaluated while WWW has the lowest water rates. An evaluation of water rates and the economic benefits to water utilities in relation to the proposed project is presented under each alternative.

4.2.4 PROPERTY OWNERSHIP AND EMINENT DOMAIN

Relocation impacts can occur when existing homes, businesses, or agricultural activities overlap with potential project areas. Most potential pipeline routes are located within paved roadways and as such are not vulnerable to relocation impacts. Only pipeline segment 21 traverses an area currently utilized for agriculture; this farmland is being relocated to the Depot Campus as explained in the Technology Park FEIS. Well sites MD-1, EP-5, and MH-2 are located in existing agricultural areas and would have potential relocation impacts if selected as the eventual alternative. The Town of Mansfield currently has five-year leases with local farmers for these properties that would have to be renegotiated if one of these alternatives were selected. The acquisition of property through eminent domain is not proposed under any alternative.

Right-of-Way (ROW) acquisitions are often necessary in utility and roadway projects. Currently, the University is working to acquire a ROW along areas of existing driveways at the proposed intersection of Route 44 and North Hillside Road (pipeline segment 21). Other easements may also be needed depending on the eventual alternative. For example, a site for a new WWW tank in southern Mansfield may require vehicle and water main easements through adjacent properties. If an agreement cannot be reached with a property owner, a different location or access route will be utilized.

4.3 COMMUNITY FACILITIES AND SERVICES

A variety of community facilities and services exists within the potential project communities. These include educational, public safety, emergency services, parks and recreational facilities, and public transportation services. In addition, the University provides a significant community resource to University students, faculty, and staff as well as to residents of the surrounding area. Each of these is described below for potential pipeline routes in Mansfield, Tolland, Coventry, and Bolton. A discussion of community facilities and services in the remaining communities is not pertinent to this EIE for the following reasons:

- East Hartford: This area is already served by MDC such that facilities in this municipality would not be served by the new water main. Sunset Ridge School is located along the water main route.

- Manchester: These areas lie almost exclusively within interstate highways such that there would be no service connections. In addition, the Town of Manchester provides water service in adjacent areas and holds the Exclusive Service Area (ESA) for the majority of Manchester.

- South Windsor and Vernon: These areas lie almost exclusively within Interstate highways such that there would be no service connections. In addition, CWC provides water service in adjacent areas and holds the ESA in nearby areas. Potential water main upgrades in Vernon associated with the CWC interconnection alternative are also within areas currently served with public water.

4.3.1 EDUCATION

The University is Connecticut's flagship university and one of the top 25 public institutions in the nation. The Main Campus is located generally along Route 195 in Storrs between Route 275 and Route 44. The future expansion of University facilities is a focal point of all of the build alternatives presented in this EIE although student enrollment is not expected to significantly increase as a result of development since new dormitories and other housing are not proposed.

No educational facilities are located along the potential interconnection routes through Bolton, Tolland, and Coventry.

Several municipal and private schools in Mansfield are located within the evaluation area. Mansfield's Goodwin Elementary School is located along Hunting Lodge Road, and Mansfield Middle School is located on Spring Hill Road. Southeast Elementary School on Route 89 is the location of potential wellfield MH-3, and potential wellfield MH-2 is located across Bassetts Bridge Road from the Mount Hope Montessori School. Some schools in Mansfield, such as E.O. Smith High School (Regional School District #19), are already serviced with public water supply.

4.3.2 PUBLIC SAFETY AND EMERGENCY SERVICES

The proposed action could impact existing public safety and emergency services either through the installation of fire protection hydrants in areas that currently do not have water service or by spurring localized commercial and/or residential growth that would rely on existing services. A description of existing services is presented below. Note that nearby medical services in Manchester, Mansfield, Willimantic, and Vernon are already serviced with public water.

Town of Bolton

The Town of Bolton has a Resident State Trooper and a volunteer fire department. The Bolton Fire Department has approximately 50 members and responds to fire, rescue, medical, and environmental emergencies. The town has three dry hydrants from which they draft water to shuttle to fires.

Town of Coventry

The Town of Coventry has an Emergency Management Director who oversees emergency management in town. The Town of Coventry has a full-time, full-service police department. The department is headquartered on Route 31 in South Coventry.

The Coventry Volunteer Fire Association provides primary fire protection for the south end of town and ambulance service throughout the town. They have an active membership of over 40 members trained in fire fighting and emergency medical services. The North Coventry Volunteer

Fire Association provides primary fire protection to the north end of town and rescue services townwide.

Fire hydrants are not available along the Route 195 corridor or the Route 44 corridor in Coventry. Water supply for fire protection in this area is limited to that carried in pumpers and what can be withdrawn from nearby ponds, streams, and rivers.

Town of Mansfield

The Town of Mansfield maintains three fire stations. The Eagleville Fire Station is located on Route 195 just north of the Route 44 intersection. The Mansfield Fire Station is also located on Route 195, south of the Main Campus near the intersection with East Road. The third station is located on Route 32 near the intersection of South Eagleville Road. The town also has an Office of Emergency Management that promotes emergency and disaster preparedness.

The Mansfield Police Department is located in the municipal complex located just south of the Main Campus on the corner of Route 195 and South Eagleville Road. The department consists of ten state troopers and one part-time police officer. All of these facilities are located along the various alternative potential connection routes.

The University also employs its own full-time police, fire, and emergency services. The University Police Department is headquartered on North Eagleville Road. It consists of over 50 officers in Storrs. These officers are also appointed special constables within the Town of Mansfield. Emergency services can be accessed via approximately 175 on-campus emergency phones or via telephone or cellular phone.

The University Fire Department has its main firehouse on North Eagleville Road. The Fire Department has over 50 uniformed officers and a variety of ambulance and fire-fighting equipment. It is primarily dedicated to responding to fire and emergency calls on the Storrs campus but also has mutual aid agreements with the Town of Mansfield. The University Dispatch Center answers emergency calls made from the Storrs campus and dispatches the appropriate emergency resources. The Fire Department responded to approximately 7,000 emergency calls in 2010.

Public water supply is available for fire protection in some areas of Mansfield. WWW provides fire protection services in southern Mansfield. Most notably, the University has a large network of hydrants on its Main Campus and Depot Campus to provide public fire-fighting water. In other areas of Mansfield, fire fighters rely on dry hydrants, water conveyed in pumper trucks, or nearby ponds or rivers to fight fires. Some developments have been built with fire protection tanks that can provide necessary water. Mutual aid agreements are also utilized during emergencies.

Town of Tolland

The Town of Tolland has an Emergency Management Director who oversees the public safety and fire departments. The town employs the services of five Resident State Troopers from the Connecticut State Police. Tolland is home to Connecticut State Police Troop C, located on Route 74 near Exit 69 off Interstate 84.

The Tolland Fire Department has six full-time fire fighters and emergency medical technicians and approximately 55 volunteers who provide fire, ambulance, and emergency medical service to the town. The department operates out of four fire stations located throughout the town.

Much of the town of Tolland has public water supply available for firefighting through the CWC and the Town of Tolland water systems. The southern portion of Route 195 in Tolland does not have public water service. Water supply for fire protection in this area is limited to that carried in pumpers and what can be withdrawn from nearby ponds and the Willimantic River.

4.3.3 PARKS AND RECREATION

Town of Bolton

Pipeline segment 2 extends along Interstate 384 and Route 44 in Bolton. This segment would pass adjacent to Bolton Notch State Park and the State Boat Launch at Lower Bolton Lake.

Town of Coventry

There are no parks or recreational areas located in Coventry along the pipeline segments 11, 12A, and 12B (Route 195 and Jones Crossing Road). Only two recreational areas are located along the Route 44 corridor in Coventry (pipeline segment 2): The Twin Hills Country Club is located on the west side of Route 31 just north of Route 44 and the Manchester Coon and Fox Club owns lands north of Route 44 and west of North River Road.

Town of Mansfield

The University and the Town of Mansfield maintain many areas that are utilized for active and passive recreation. Parks and recreation areas in Mansfield are located along potential connection routes as noted in Table 4.3-1. Several of these areas are already served by water supplies.

The UConn Forest off Gurleyville Road is located in the vicinity of the Fenton River Wellfield (pipeline segments 36 and 37). According to the 2004 *East Campus Plan of Conservation and Development*, the Fenton Forest Tract is the largest contiguous forest parcel owned by the University and is classified as a "Preservation" area. Passive recreation is supported in preservation areas. The Connecticut Forest and Park Association noted during the scoping period that they have a conservation easement restriction for activities on the UConn Forest parcel.

Town of Tolland

A large dedicated plot of open space (the former Dimock property) is located in the southeastern corner of Tolland near a proposed interconnection route. This area is utilized for passive recreation.

TABLE 4.3-1
Town of Mansfield Recreational Facilities

Site	Location	Pipeline Segment	Facilities	Water Supply
Buchanan Center (Library)	Warrenville Road (Route 89)	30	-multiuse ball field/picnic area -children's playscape -indoor auditorium with stage	Well
The Commonfields	Bassetts Bridge Road	26, 27	-hiking trails	None
Coney Rock Preserve	Chaffeeville Road/ Mulberry Road	33, 36	-hiking trails	None
Dunhamtown Forest	Maple Road	39	-hiking trails	None
Eagleville Preserve	Stafford Road / South Eagleville Road	41, 42	-fishing access to Willimantic River -hiking trails -community garden area	None
Fifty-foot Cliff	Storrs Road / East Road	40	-hiking trails	None
Goodwin School	Hunting Lodge Road	17	-multiuse ball field -four outdoor basketball hoops -children's playscape -indoor gym/auditorium	Well
Lions Club Park (leased by the town)	Baker Road	33	-multiuse ball fields/soccer fields -snack bar, picnic pavilion	Well
Mansfield Hollow State Park & Wildlife Area	Bassett Bridge Road, Route 89, Chaffeeville Road	23, 24, 25, 31, 32, 33, 35	-hiking, biking, picnic areas, scenic views, boat launch	None
Mansfield Middle School/Spring Hill Fields	Spring Hill Road	39	-multiuse ball fields and perimeter track -four tennis courts -four outdoor basketball hoops -indoor gym/auditorium	Well
Moss Sanctuary	Route 195	40	-hiking trails	None
River Park	Plains Road	56	-hiking trails, picnic areas, cross-country skiing, fishing/canoeing/kayaking access to the Willimantic River	None
Schoolhouse Brook Park	Clover Mill Road	39	-hiking, picnic areas, fishing, swimming, canoeing, cross-country skiing, mountain biking	Well
Southeast School/Southeast Park	Warrenville Road	29, 30, 31	-multiuse ball fields with baseball diamonds -two outdoor basketball hoops -children's playscape -indoor gym/auditorium	Well
UConn Forest	Chaffeeville Road	35, 36	-hiking	None

Source: 2006 Plan of Conservation and Development, Town of Mansfield website, Connecticut DEEP

4.3.4 PUBLIC TRANSPORTATION

Town of Bolton

Bolton is served by a regional transportation system with commuter bus service to Hartford and a commuter parking lot on Route 6/Route 44.

Town of Coventry

Coventry is served by a regional transportation system with commuter bus service to Hartford and a commuter parking lot on Route 44. There is no transit service between Vernon and Windham or student bus service between the University and Coventry. The town's 2010 *Plan of Conservation and Development* suggests exploring such public transportation options.

Town of Mansfield

Public transportation in the vicinity of potential pipeline routes is provided by the University and the Windham Region Transit District (WRTD). The WRTD Storrs-Willimantic Bus serves Mansfield, Storrs, and Willimantic Monday through Saturday. This service operates primarily in the Route 195 corridor. The University Transportation Services operates a network of shuttle buses, accessible vans, and small vehicles for University students, employees, and visitors. The buses primarily travel in the immediate vicinity of campus. The 2006 *Plan of Conservation and Development* for the Town of Mansfield calls for expansion of both the WRTD and the University shuttle service to more areas of Mansfield.

4.4 AESTHETIC AND CULTURAL RESOURCES

Aesthetic and cultural resources include cultural and arts centers, places of worship, scenic drives, ridgeline vistas, greenways, modern architecture, neighborhood appearance, historical buildings and lands in historic districts, and archaeological features. As potential pipeline routes could involve new infrastructure spanning several municipalities, an analysis of existing known features is presented below.

The information in this section was obtained from municipal planning documents. Three letters were sent to the State Historic Preservation Officer and the State Archaeologist for comment. Response is pending.

Town of Bolton

Potential pipeline routes in Bolton could occur within the Interstate 384 and Route 44 corridor east of Interstate 384. Bolton's 2005 *Plan of Conservation and Development* identifies features such as the Hop River State Park Trail and a scenic ridge line in the vicinity of Bolton Notch. Several historic properties and the town's post office are located in this area. Additional historic properties are located along Route 44 on the south side of Lower Bolton Lake, including several homes, the former North School House, the United Methodist Church, and the Quarryville Cemetery. The Saint George Episcopal Church is also located near the south end of Lower Bolton Lake.

Town of Coventry

Potential pipeline routes in the town of Coventry could occur in the Route 195 corridor west of the Willimantic River and Jones Crossing Road under the CWC and MDC alternatives, or along Route 44 for the MDC alternative. The town's 2010 *Plan of Conservation and Development* indicates that over 50% of the town is considered to be archaeologically sensitive.

Only one aesthetic or cultural resource has been identified along the Route 195 corridor: The Storrs Community Church is located on Dimock Road just off Route 195. However, this corridor may contain some structures that are greater than 50 years old, including on Jones Crossing Road. Jones Crossing Road is a narrow residential road with several small farms. The road dead-ends at the Willimantic River. The concrete bridge abutments of a former bridge exist at this location. Discussion has been made between the towns of Coventry and Mansfield related to utilizing the bridge abutments for constructing a pedestrian bridge across the Willimantic River.

Several areas of aesthetic and cultural value are identified along the Route 44 corridor. Scenic vistas are identified near Cedar Swamp Road Extension and Silver Street, and the Glass Factory Historic District (including the Turner House owned by the Museum of Connecticut Glass) has been identified near North River Road. Several historic homes, the Brick School House, and the Brigham Tavern are also located in this corridor. Modern houses of worship include the Second Congregational Church and the Presbyterian Church of Coventry.

Town of East Hartford

This area is already served by the MDC such that facilities in this municipality would not be served by the new water main. The town's 2003 *Plan of Conservation and Development* does not identify any aesthetic or cultural resources along the section of Silver Lane associated with potential pipeline routes other than a Post Office and the Silver Lane Cemetery. The Faith Lutheran Church and the Crossroads Community Cathedral are also located along this route.

Towns of Manchester, South Windsor, and Vernon

Potential pipeline routes within these communities lie almost exclusively within interstate highways such that there would be no service connections and minimal impact to aesthetic or cultural resources.

Town of Mansfield

There are many areas in Mansfield with aesthetic and cultural resources that lie within the study areas. According to the town's 2006 *Plan of Conservation and Development*, historic stores, mills, and commercial buildings; public buildings; churches and facilities of historic interest; and 18th and 19th century residences are located along nearly all potential pipeline routes. Historic sites of further cultural value are also located along almost all potential pipeline routes. Archaeological areas of sensitivity as well as historic and prehistoric site areas are also located along many pipeline routes such as along Route 32, Route 44, Route 195, Chaffeeville Road, and Gurleyville Road.

Potential pipeline routes further pass through historic villages or hamlets including Mansfield Depot, Mansfield Four Corners, Eagleville, Spring Hill, Gurleyville, Chaffeeville, Mansfield Center, and the northern edge of Mansfield Hollow. These areas were originally settled in the mid to late17th century. In particular, many historic businesses in Mansfield Four Corners have become vacant. Additional historic districts are associated with the original University buildings along Route 195 and the former Mansfield Training School (now the Depot Campus) on Route 44. Potential pipeline routes also pass by many cemeteries. These include the Tilden, Old Storrs, Barrows, and Old Mansfield Center cemeteries on Route 195; the Mansfield Training School Memorial Grove on Route 44; and the Riverside Burying Ground on Gurleyville Road.

Mansfield's 2006 *Plan of Conservation and Development* further identifies the entire town as a scenic resource. Classifications include water, viewsheds, valley floor, drumlins, ridges, and other land forms that are given different priorities for preservation. Potential pipeline routes pass through several of these classifications including those considered the most important for preservation (Viewshed-Class-I-HS). In addition, several pipeline routes pass by the Nipmuck Trail Greenway that runs along the Fenton River as well as crossing Route 195 near Fifty-Foot Cliff.

The Town of Mansfield has an active community center on South Eagleville Road hosting a variety of recreational, educational, and cultural programs. The University campus has four libraries, three museums, several performing arts venues, and a religious community consisting of a wide variety of faiths. Several buildings also boast modern architecture. Each of these facilities has public water service. The Mansfield Historical Society is located on Route 195 south of campus and does not have public water service.

Houses of worship can be found in areas off the University campus.

- The Saint Paul's Collegiate Church is located on Route 195 north of campus.
- The Mansfield Christian Fellowship is located on Depot Road near Route 44 in Mansfield Depot.
- The Saint Joseph Church is located at the intersection of Route 32 and Route 275 – this church may not be in use.
- The First Baptist Church of Mansfield is located on Route 195 south of campus.
- The First Church of Christ is located in Mansfield Center at Route 89.
- The Church of Christ is located south of Mansfield Hollow on Route 195.

Several recommendations of the town's 2006 *Plan of Conservation and Development* apply to protecting cultural resources. These include:

- Refine zoning and subdivision regulations to identify significant historical and archaeological resources and utilize buffers, setbacks, and other regulatory provisions to protect such resources, particularly in historic districts.
- Establish village zoning designations or design plan standards.
- Consider adopting an ordinance requiring advance notice before a historic structure is moved or demolished or a historic structure is disturbed.
- Consider National Historic District designations for all historic villages in the town.

Town of Tolland

Potential water main areas in the town of Tolland are limited to the Interstate 84 corridor between Bolton and Exit 68 and the Route 195 corridor between Interstate 84 and the Town of Coventry. The Tolland 2010 *Plan of Conservation and Development* has identified greenways crossing Interstate 84 in the vicinity of Chapins Meadow Brook and Paulk Hill Brook as well as along the Skungamaug River, which passes beneath Route 195 near Interstate 84. Another primary greenway has been identified along the Willimantic River corridor. The plan further identifies scenic views along Interstate 84 and notes that the Benton Homestead (a historic site) is located on the south side of Interstate 84 on Metcalf Road.

Cultural or art centers, modern architecture, and historic districts or sites do not appear to be located along Route 195. One place of worship, the River of Life Christian Fellowship, is located in the Twin Ponds complex near Anthony Road. Public water service is currently available in the area. Homes that are greater than 50 years old may be located along this route, particularly the southeastern section of Route 195 leading toward Coventry.

4.5 PUBLIC WATER SUPPLY

Existing public water supply service and capability are paramount to the evaluation of potential interconnections evaluated in this EIE. In particular, the ability of an interconnection alternative to meet the stated project purpose and need of providing 1.2 million gallons per day (mgd) average day demand (ADD) and 1.93 mgd peak day demand (PDD) is a critical threshold for determining project viability.

The narrative below describes existing water supply planning and existing utilities potentially affected by the alternatives evaluated herein. This inventory provides a baseline against which to measure impacts of alternatives as presented in the remainder of this document. Note that financial considerations related to water utilities and customers are discussed in Section 4.2.

4.5.1 THE WATER UTILITY COORDINATING COMMITTEE PROCESS

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 Department of Public Utility Control (DPUC), Department of Environmental Protection (DEP), and the OPM, was given the charge of developing a coordinated approach to long-range water supply planning to ensure future supplies.

The legislative finding, as reflected in Section 25-33c of the Connecticut General Statutes, 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 Department of Public Health 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, the boundaries of the state's seven public water supply management areas have been delineated based upon 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 towns of East Hartford, Manchester, South Windsor, and Vernon are part of the Upper Connecticut River Water Supply Management Area. The towns of Bolton, Coventry, Tolland, and Mansfield are part of the Northeast Water Supply Management Area.

The Connecticut General Statutes require that the Commissioner of Public Health convene a water utility coordinating committee (WUCC) for each public water supply management area 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 public water supply management area and one representative from each regional planning agency within such area, elected by majority vote of the chief elected officials of the municipalities that are members of such regional planning agency.

To date, coordinated planning has occurred in the Housatonic Water Supply Management Area (convened in June 1986), the Upper Connecticut River Water Supply Management Area (convened in March 1987), the South Central Water Supply Management Area (convened in November 1987), and the Southeast Water Supply Management Area (convened August 5, 1998). Planning has not convened for the Northeast Water Supply Management Area.

A coordinated water system plan is comprised of the individual water supply plans of the public water systems within the public water supply management area and an areawide supplement, which includes a water supply assessment, delineation of exclusive service area boundaries, an integrated report, and an executive summary.

Pursuant to Paragraph (d)(2)(B) of Section 25-33h-1 of the Regulations of Connecticut State Agencies (Regulations Concerning Coordinated Water System Plans), "the WUCC shall prepare preliminary and then final 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.

Establishment of ESA boundaries is intended to ensure safe and adequate water supply to every resident of the state while discouraging redundancy of public water system service and the expansion of public water systems into or through other public water systems. ESAs are based on regulatory criteria and on the agreement by a system to serve, as necessary, previously identified unserviced areas. Existing service areas are maintained and become ESAs via the delineation process. As part of this process, each individual public water system is provided the opportunity to request or not request expanded service areas.

ESAs are commitments to service and not areas of "right-of-first-refusal." They convey a right as well as a responsibility to serve. A public water system may develop water supply sources in areas not within its ESA, assuming all pertinent federal, state, and local requirements are adhered to.

Pursuant to Paragraph (d)(2)(B)(i) of Section 25-33h-1, in establishing ESA boundaries, the WUCC shall:

(aa) Allow utilities to maintain existing service areas
(bb) Not leave areas as unserviced islands unless it can be demonstrated that there is not and will be no future need for public water service
(cc) Not allow new service areas or main extensions which create duplication or overlap of services

Part (cc) pertains to the establishment of new ESA boundaries but sends a clear message that in the formation of ESAs the expectation is that future main extensions should not create duplication or overlapping public water service.

Statutorily, CGS 25-33(g)(b) states that "In considering any change to exclusive service area boundaries, the commissioner shall maintain existing service areas, consider established exclusive service areas, and consider the orderly and efficient development of public water supplies." While this clause specifically addresses changes in ESA boundaries, it also memorializes the state's preference for orderly development of public water systems.

ESAs have been established in the Upper Connecticut River Water Supply Management Area but not in the Northeast Water Supply Management Area. The Town of Manchester holds the ESA for the entire town. CWC holds the ESA for eastern South Windsor and all of Vernon. ESAs have not been established in Bolton, Coventry, Tolland, and Mansfield.

4.5.2 UNIVERSITY OF CONNECTICUT

The University's 2011 *Water Supply Plan* provides a detailed analysis of system capabilities and the need for additional water to meet committed demands through the long-term (50-year) planning period. The University relies on two groundwater wellfields (one on the Fenton River and one on the Willimantic River) to supply water to the University's Main Campus system and the Depot Campus system. These systems provide water service to approximately 14,037 people through 370 service connections according to information available from Connecticut DPH[2]. The Northeast WUCC has not yet convened; therefore, the University does not have an ESA.

Over the past decade, the University has conducted studies to determine the impacts of pumping these wellfields on nearby fish habitat. The results of these studies have led to the University ceasing withdrawals[3] at the Fenton River Wellfield when streamflow drops below six cubic feet per second (cfs) and imposing voluntary and mandatory conservation measures when streamflow in the Willimantic River drops below a series of thresholds.

The self-imposed withdrawal cessation at the Fenton River Wellfield reduces the amount of available water to the University during certain times of the year. As noted in Table 7-1 in the

[2] The actual population served is believed higher.
[3] According to the University's 2011 *Wellfield Management Plan*, the recommendations of the Fenton River Study are to scale back withdrawals at certain thresholds of river flow between six cfs and three cfs and to cease withdrawals at three cfs. However, in practice, it is often more straightforward to simply shut down the wells at six cfs rather than maintaining daily adjustments of flow rate, so this is how the wellfield is typically operated.

2011 *Water Supply Plan*, available supply from the Fenton River Wellfield is assumed to be zero during the months of June through October due to streamflow conditions at the Fenton River typically being below six cfs during that period each year. This reduces the University's projected margin of safety (MOS) for ADD below 1.15 for most of the summer months and below 1.0 for the months of September and October. While PDD can be met through the use of the University's ample storage supplies, the failure to meet ADD is indicative of the need for additional supply sources.

The University has embarked on several projects for increasing available water in the short term. The first are studies of Well D at the Fenton River Wellfield. The University has been conducting modeling studies to determine if Well D could be activated for short periods during the months of September and October when the Fenton River is below three cfs while minimizing environmental impact. The use of Well D may be justified since this well is (1) located the furthest downstream on the Fenton River; (2) is located downstream of Roberts Brook (a principal tributary); and (3) is located downstream of "Modeling Sub-Reach 2," upon which the recommendations of the Fenton River Study were based. The 2011 *Water Supply Plan* indicates that a total of 0.35 mgd could potentially be obtained from Well D over an 18-hour pumping day if necessary. Once approved by CT DEEP, the availability of this water will increase system MOS above 1.0 in the short term but not through the 20-year planning period.

The second project the University has undertaken to increase its water supply capacity is the creation of a reclaimed water facility. This project is expected to be completed in 2012 and will have a peak capacity of 1.0 mgd. The facility will provide up to 0.4 mgd of nonpotable water that will be utilized to supply the Central Utility Plant on the Main Campus. This supply will also be available for future irrigation. Use of the reclaimed water will lessen the demand on the potable water supply by the same amount. The operation of this facility will increase MOS for ADD above 1.15 for all months in the short term and improve MOS for peak days. However, an additional source of supply is necessary to raise intermediate-term and long-term MOS above 1.15 for ADD and 1.0 for PDD.

The purpose of the proposed action is to connect the University water system to an additional source of supply capable of providing an additional 1.93 mgd. An additional supply source will also enable a higher degree of reliability from a planning standpoint. For example, the Fenton River Wellfield is shut down much of the summer and autumn and is therefore considered to be less reliable than the Willimantic River Wellfield. Interconnections with other water utilities are expected to be very reliable as they rely primarily on surface water sources while new wellfields may not be as reliable since they may be subject to environmental constraints similar to those at the University's existing wellfields.

4.5.3 THE TOWN OF MANSFIELD

While the Town of Mansfield does not operate a public water system, it prepared a water supply plan in 2002 to evaluate drinking water supply needs within Mansfield and to identify and understand the town's role in regional water supply planning. While this document is over a decade old, the information within provides a good understanding of potential water demands located away from the University water system such as Mansfield Four Corners development, a planned elderly and assisted living facility, and a number of residential developments. Provision

of public water to these areas is consistent with Mansfield's *Plan of Conservation and Development*.

4.5.4 THE CONNECTICUT WATER COMPANY

The CWC Northern Operations Western System provides public water supply to areas of Suffield, Enfield, Somers, East Granby, Windsor Locks, East Windsor, Ellington, South Windsor, Vernon, Manchester, and Tolland. It has a service population of 75,737 through 31,823 service connections according to Connecticut DPH. CWC predominantly provides water supply within its ESA in the areas that lie within the boundary of the Upper Connecticut River WUCC. As the Northeast WUCC has not yet convened, CWC does not have an ESA in Tolland.

The CWC utilizes one surface water source (Shenipsit Reservoir) and several groundwater sources to meet demands in its Northern Operations Western System ("Western System"). These are listed in Table 4.5-1 based on the discussion in its 2011water supply plan addendum.

TABLE 4.5-1
CWC Northern Operations Western System Active Supply Sources
(2011 Water Supply Plan Addendum)

Supply Source	Town	Average Day Capacity, MG (18-hour)	Peak Capacity, MG (24-hour)	Diversion Registration or Permit (mgd)
Shenipsit Reservoir (Rockville Water Treatment Plant)	Vernon	6.00	6.00	15.00
Hunt Wellfield	East Windsor	2.12	2.82	4.18
Spring Lots Wellfield	Enfield	2.35	3.13	3.69
Powder Hollow Wellfield	Enfield	1.88	2.50	2.78
Vernon Wells	Vernon	0.54	0.72	0.95
Pine Knob Well	South Windsor	0.25	0.33	0.65
Mapleton Wells	Suffield	0.16	0.21	0.58
O'Bready Well	Enfield	0.27	0.36	0.50
Ellington Acres Wells	Ellington	0.27	0.36	0.36
Woodland Park Well	South Windsor	0.12	0.16	0.25
West Suffield Well	Suffield	0.08	0.10	0.12
Available Supply		**14.04**	**16.69**	**29.05**

Coincident with the University's individual water supply plan submittal in May 2011, DPH requested additional information from CWC to evaluate future MOS in the Northern Region's Western System. CWC provided such information, including updated projections, and DPH prepared an analysis that was included in the scoping comments dated June 30, 2011. Refer to Appendix B for a copy of the scoping comments. DPH's analysis was based on Western System water demands through calendar year 2010 presumably because the year 2010 was the most recent full calendar year with available consumption data. These are summarized in Table 4.5-2.

CWC's updated water demand projections for the Western System were based on a starting point equal to a five-year average of the ADD. Maximum month average day demand (MMADD) and

PDD were likewise calculated from peaking ratios that were five-year averages. While these are appropriate planning methods for many water utilities, DPH has in the past elected to utilize more conservative methods of estimating water demands such as using the highest peaking factors to calculate MMADD and PDD from ADD and using a year of higher overall water demands as the base year.

TABLE 4.5-2
Historical Water Demands in the CWC Northern Operations Western System (MG)

Year	ADD	MMADD	PDD
2001	9.77	12.13	15.69
2002	9.55	12.14	15.03
2003	9.25	11.12	12.96
2004	9.56	11.60	14.21
2005	9.98	12.53	15.84
2006	9.36	11.67	14.44
2007	9.71	11.89	14.79
2008	8.97	10.66	12.95
2009	8.72	10.39	12.77
2010	10.01	13.20	16.65
2011	9.20*	11.68	15.17

*2011 ADD through September 2011 (represents partial year)

In the memo included with its scoping comments, DPH calculated projected MOS for the Western System using water demand projections based on the five-year averages and based on the relatively higher water demands recorded in 2010. DPH then ran these calculations for CWC's projections under two scenarios: (1) with an additional demand of 0.5 mgd for the University and Mansfield; and (2) with an additional demand of 1.0 mgd for the University and Mansfield. In short, four sets of MOS were calculated by DPH. In all cases, MOS dropped below 1.15 and then 1.0, indicating that CWC would need additional sources of supply to provide 0.5 mgd to 1.0 mgd to the University and Mansfield. DPH commented that additional supply could be derived from an expansion of the Rockville Water Treatment Plant (WTP).

CWC provided formal amendments to its Northern Region water supply plan on October 3, 2011 and October 31, 2011. Only the sections related to the Western System were modified as the Stafford System and satellite systems have no bearing on supply from the Western System to the University and Mansfield. In these amendments, CWC provided revised water demand projections using five-year averages for the years 2007 through 2011.

Several adjustments were necessary to accomplish these projections. First, because the Somers system and former Ellington Acres Company system were consolidated into the Western System in early 2009, the demand figures from 2007 and 2008 were increased as if the systems had been combined. Second, given the date of the amendments, the 2011 figures were based on slightly more than seven months of recorded water demands. Both of these adjustments are considered appropriate for valid planning. The ADD, MMADD, and PDD for the data from 2011 are also listed in Table 4.5-2. Note that these 2011 water demand figures are intermediate between those reported for 2009 and 2010, further demonstrating that the 2010 demands may have represented an anomaly of sorts with a temporary increase in water production for that year.

In its revised projections, CWC again utilized a 0.25% increase in system growth per year. Table 4.6.2a of the plan amendments demonstrates that without the provision of water to the University and Mansfield CWC can provide sufficient water to the Western System while maintaining MOS for the ADD above 1.15 and MMADD and PDD MOS above 1.0. Portions of that table are presented below as Table 4.5-3. Note that these projections have been updated to include the figures from the calendar year 2011.

TABLE 4.5-3
Existing and Projected MOS in the Western System (2011 Revised Projections)

Year	ADD	ADD MOS	MMADD	MMADD MOS	PDD	PDD MOS
2007	9.71	1.45	11.89	1.18	14.79	1.13
2008	8.97	1.57	10.66	1.32	12.95	1.29
2009	8.72	1.61	10.39	1.35	12.77	1.31
2010	10.01	1.40	13.20	1.06	16.65	1.00
2011	8.94	1.57	11.68	1.20	15.17	1.10
Five-Year Mean	**9.27**	**1.51**	**11.56**	**1.21**	**14.47**	**1.15**
2015	*9.36*	1.50	*11.67*	1.20	*14.59*	1.14
2020	*9.48*	1.48	*11.81*	1.19	*14.77*	1.13
2030	*9.72*	1.44	*12.11*	1.16	*15.15*	1.10
2060	*10.48*	1.34	*13.05*	1.08	*16.33*	1.02

Note: Projected demands are in *italics*.

The information in Table 4.5-3 indicates that CWC has additional water that could be transferred to the University under the ADD and MMADD condition through 2030 while maintaining a MOS of 1.15. Additional water would be necessary to meet MMADD in 2060 while maintaining a MOS of 1.15. Additional water would be necessary to meet PDD while maintaining a MOS of 1.15 for all of the projections. As such, the transfer of water to the University and Mansfield would require CWC to implement some of its short-term, intermediate-term, and long-term improvement projects to increase available supply as part of this project.

4.5.5 THE METROPOLITAN DISTRICT COMMISSION

The MDC provides public water supply to portions of East Granby, Windsor Locks, Windsor, Bloomfield, South Windsor, West Hartford, Hartford, East Hartford, Manchester, Farmington, Newington, Wethersfield, Glastonbury, and Rocky Hill. It has a service population of 388,700 through 95,868 service connections according to Connecticut DPH. Additional communities are served through interconnections. MDC predominantly provides water within its ESA in these areas, which lie within the Upper Connecticut River WUCC.

The MDC prepared its last water supply plan in July 2008. As the document does not include more recent water demands and projections, a copy of the internal Connecticut DPH technical evaluation utilized to prepare its July 2012 scoping comments was utilized to determine the capability of MDC to provide water to the University and Mansfield.

The MDC utilizes two surface water reservoirs (Barkhamsted and Nepaug) to collect raw water and routes this water through two storage reservoirs (West Hartford No. 2 and No. 3) to its two distribution reservoirs (West Hartford No. 5 and West Hartford/Bloomfield No. 6) to provide

available supply. The distribution reservoirs are located adjacent to MDC treatment facilities in West Hartford and Bloomfield. The MDC supply sources have a safe yield of 77.1 mgd. Treatment capacity at the two facilities is 124.0 mgd with all filters operational at maximum capacity but is considered to be 113.4 mgd with one filter offline in West Hartford.

The MDC has a variety of agreements with neighboring water utilities, which limits its available water supply. Some of these agreements are for emergency use only, others are direct customers of MDC and thus are directly included in system demands, and the remainder includes agreements with average and maximum daily commitments. The four agreements with other water utilities that are typically utilized for nonemergency purposes include interconnections with the New Britain Water Department, the CWC Collinsville System, the CWC Unionville System, and the Town of Portland. Commitments to these utilities reduce available water supply to the MDC system and are characterized below:

- New Britain Water Department: MDC has an agreement to provide an average of 5.0 mgd, with a maximum of 10.0 mgd of raw water.
- CWC Collinsville System: MDC has an agreement to provide an average of 0.65 mgd, with a maximum commitment of 1.3 mgd of treated water.
- CWC Unionville System: MDC has an agreement to provide 2.14 mgd of treated water.
- Town of Portland: MDC has an agreement to provide 1.1 mgd of treated water, with a maximum sales commitment of 2.0 mgd.

Based on the MDC system safe yield, treatment capacity, and service commitments to other utilities, the Connecticut DPH has calculated total available water in the MDC system at this time to be 68.21 MG to meet ADD, 97.96 MG to meet MMADD, and 108.56 MG to meet PDD. Note that the total available water for MMADD and PDD are generated using treatment capacity while ADD is met utilizing system safe yield.

Table 4.5-4 presents historical and projected demands in the MDC system based on the Connecticut DPH analysis. The analysis indicates that at the present time MDC has sufficient water supply to meet its ADD, MMADD, and PDD through the long-term (2050) planning period while maintaining an adequate MOS.

The MDC entered into an agreement with the Farmington River Watershed Association and the Town of Portland in 1998 wherein MDC agreed to proceed to the next phase of groundwater development in Glastonbury, Connecticut when its system ADD MOS reaches 1.10. The agreement calls for the development of no less than three high-yielding wells with a minimum combined safe yield of 1.5 mgd. According to the July 2008 MDC water supply plan, an exploratory drilling program was conducted in 1995 that generated potential yield estimates of 0.5 to 3.0 mgd at the various test well sites. This new groundwater supply could potentially be utilized to offset any transfers of water to the University and Mansfield if necessary based on margins of safety.

TABLE 4.5-4
Historical and Projected Water Demands in the MDC System

Year	ADD (MG)	ADD MOS	MMADD (MG)	MMADD MOS	PDD (MG)	PDD MOS
2002	57.25	1.19	76.25	1.28	90.85	1.19
2003	55.13	1.24	67.14	1.46	76.74	1.41
2004	54.71	1.25	65.07	1.51	76.19	1.42
2005	55.43	1.23	70.11	1.40	87.79	1.24
2006	52.56	1.30	64.19	1.53	80.49	1.35
2007	54.55	1.25	66.53	1.47	78.38	1.39
2008	52.79	1.29	61.48	1.59	75.22	1.44
2009	52.50	1.30	60.09	1.63	70.87	1.53
2010	52.40	1.30	69.41	1.41	88.65	1.22
2011	49.52	1.38	65.76	1.49	87.06	1.25
2012	*53.61*	*1.27*	*69.15*	*1.42*	*83.45*	*1.30*
2020	*55.39*	*1.23*	*71.31*	*1.37*	*86.06*	*1.26*
2050	*57.73*	*1.18*	*74.18*	*1.32*	*89.51*	*1.21*

Note: Projected demands are in *italics.*

4.5.6 WINDHAM WATER WORKS

WWW provides water services to Windham and the southern portion of Mansfield. It has a service population of 20,193 through 4,803 service connections according to information available from Connecticut DPH. The Northeast WUCC has not yet convened; therefore, WWW does not hold an ESA.

WWW utilizes a single water supply source (the Willimantic Reservoir, an impoundment of the Natchaug River) to provide available supply. Water is directed to a filtration plant located just west of the Willimantic Reservoir in southern Mansfield. The treatment plant consists of two separate buildings. One building (constructed in 1885) houses all pumping equipment, and the other contains the treatment facilities. The treatment building was constructed in 1936 and has had numerous renovations and upgrades over the years. A $4.7 million upgrade was completed in 1997.

The Willimantic Reservoir has a safe yield of 7.9 mgd. Treatment capacity is 5.3 mgd with all filters operational at maximum capacity. Rated treatment capacity is based on a filter out of service and is 4.1 mgd. Withdrawals from the Willimantic Reservoir are restricted by the current water diversion permit to 4.1 mgd. WWW does not currently have any interconnections or agreements with neighboring water utilities.

WWW prepared its last water supply plan in July 2009. The Connecticut DPH utilized this document to prepare an assessment of system capability that was presented during the initial scoping period. The Connecticut DPH analysis found that WWW had sufficient supply to provide 0.5 mgd of water to the University while maintaining a system MOS of 1.15 under ADD and MMADD conditions but not under PDD conditions. The analysis further found that WWW only had sufficient supply to provide 1.0 mgd of water while maintaining a system MOS of 1.15 under the ADD condition. Under the 1.0 mgd transfer, the MMADD MOS was below 1.15 in 2020 and would immediately be below 1.00 for the PDD.

WWW prepared an update to its water supply plan projections subsequent to the Connecticut DPH scoping comments. These revisions take into account recent water usage data not available in 2009 and utilize more conservatively high estimates of projected water demand for potential developments than were presented in the 2009 *Water Supply Plan*.

Table 4.5-5 presents historical and projected demands in the WWW system from the 2009 *Water Supply Plan* and the supplemental WWW analysis. The analysis indicates that at the present time WWW has sufficient water supply to meet its ADD, MMADD, and PDD demands but will need additional water supply by the expiration of its diversion permit in 2027 as it will be unable to meet PDDs without using storage. At this time, WWW has not identified any other potential sources of supply other than the Willimantic Reservoir.

TABLE 4.5-5
Historical and Projected Water Demands in the WWW System

Year	ADD (MG)	ADD MOS	MMADD (MG)	MMADD MOS	PDD (MG)	PDD MOS
2001	2.29	1.79	2.61	1.49	3.28	1.25
2002	2.33	1.76	2.74	1.42	3.97	1.03
2003	2.51	1.63	2.79	1.40	3.19	1.29
2004	2.49	1.65	2.63	1.48	3.27	1.25
2005	2.42	1.69	2.87	1.36	3.24	1.27
2006	2.07	1.98	2.32	1.68	3.91	1.05
2007	2.15	1.91	2.56	1.52	3.06	1.34
2008	2.10	1.95	2.36	1.65	2.86	1.43
2009	2.12	1.93	2.31	1.69	2.81	1.46
2010	2.26	1.81	2.50	1.56	3.02	1.36
2013	*2.31*	*1.77*	*2.75*	*1.42*	*3.37*	*1.22*
2028	*2.93*	*1.40*	*3.49*	*1.12*	*4.28*	*0.96*
2058	*3.20*	*1.28*	*3.81*	*1.02*	*4.67*	*0.88*

Note: Projected demands are in *italics*. Yellow shading indicates a MOS below 1.15 while pink shading indicates a MOS below 1.00.

The amount of water that would be available for sale while maintaining a MOS of 1.15 under the ADD, MMADD, and PDD condition has been calculated based on the information in Table 4.5-5. Table 4.5-6 presents the results of this analysis for WWW's projected demands. Based on the information in Table 4.5-5, WWW may have water supply available to provide to the University under certain conditions in the short term but not over the 50-year planning period.

TABLE 4.5-6
Projected Water Available (MG) for Bulk Sales
in the WWW System While Maintaining MOS of 1.15

Year	ADD	MMADD	PDD
2013	1.26	0.64	0.20
2028	0.64	None	None
2058	0.37	None	None

4.5.7 TOLLAND WATER DEPARTMENT

The Tolland Water Department ("Tolland") provides public water supply within the town of Tolland, including the Route 195 corridor between Interstate 84 and Anthony Road. It lies directly in the path of two interconnection alternatives (CWC and MDC). This system supplies water to a service population of 1,455 through 485 service connections according to information available from Connecticut DPH. Similar to the University and WWW, Tolland does not hold an ESA because the Northeast WUCC has not yet convened.

Tolland last updated its water supply plan in February 2010. Tolland utilizes two wells located along the Willimantic River to provide its daily supply to its main system. A second system owned by Tolland is located on the north side of Interstate 84. This system is supplied by water purchased from CWC. Tolland's goal is to interconnect the two systems such that it will not need to purchase water from CWC. Thus, Tolland applied to the CT DEEP for a new water diversion permit in 2010. A permit was issued in June 2012 and is valid until 2027. This permit stipulates the following withdrawal conditions:

- The combined total maximum daily withdrawal from the two wells cannot exceed 0.425 mgd.
- The average daily withdrawal from Well #2 shall not exceed 0.11 mgd over any 90-day period.
- The maximum daily withdrawal from Well #2 shall not exceed 0.18 mgd.

According to the 2010 Tolland *Water Supply Plan*, Well #1 has a safe yield of 180 gallons per minute (gpm) while Well #2 has a safe yield of 200 gpm. This equates to daily safe yield (pumping rate over an 18-hour pumping day) at Well #1 of 0.1944 mgd and 0.2160 mgd at Well #2. The maximum day withdrawal for these wells would be 0.2592 mgd and 0.2880 mgd, respectively. Thus, the new diversion permit restricts the average daily use of Well #2 to half of its safe yield, leaving Well #1 to sustain much of the supply. The rate of water treatment is not a limiting factor for available water; therefore, available water in the system is calculated as follows:

- ADD and MMADD: Safe Yield of Well #1 + 0.110 mgd from Well #2 = 0.3044 mgd
- PDD: Maximum diversion permit limit = 0.425 mgd

The 2010 *Water Supply Plan* presented projections for a combined system based on a potential new water diversion permit of 0.41 mgd. The MOS associated with these projections are now out of date based on the figures in the new water diversion permit described above. Table 4.5-7 presents the projections in the 2010 *Water Supply Plan* and the system MOS based on the new diversion permit limits. Given the fact that the system will have inadequate MOS by 2020, it is expected that Tolland will perform one or more of the following: (1) operate Well #1 above its safe yield; (2) purchase water from CWC through an interconnection to help meet demands; (3) develop a new source of supply; and/or (4) renegotiate its agreement with CWC to provide water to South Willington in order to reduce its committed demands; this would allow allocation of Tolland's water back to its own system.

TABLE 4.5-7
Projected Water Demands and MOS in the Tolland System

Year	ADD (MG)	ADD MOS	MMADD (MG)	MMADD MOS	PDD (MG)	PDD MOS
2013	0.1795	1.70	0.2333	1.30	0.3590	1.18
2020	0.2380	1.28	0.3090	0.99	0.4760	0.89
2050	0.3250	0.94	0.4220	0.72	0.6500	0.65

Note: Pink shading indicates MOS below 1.00.

4.5.8 MANCHESTER WATER DEPARTMENT

The potential interconnection with MDC is routed through Manchester. Manchester supplies water to the majority of town, a portion of Glastonbury, and small areas of South Windsor and Vernon. It supplies water to 15,218 service connections and a population of 51,066 based on information available from Connecticut DPH. Its ESA (through the Upper Connecticut River WUCC) includes all of Manchester and small areas of Glastonbury and Vernon near its service area in those communities.

Manchester last updated its water supply plan in 2007 demonstrating that it has sufficient available water in its existing surface and groundwater supplies to maintain MOS above 1.15 for the ADD, MMADD, and PDD conditions through 2050. The plan notes that Manchester will take future efforts to rehabilitate and bring online some of its inactive supplies to increase system redundancy.

4.5.9 OTHER SMALL WATER SYSTEMS

The EPA has defined three classifications of public water systems. A *Community* water system is a public water system that supplies water to the same population year-round. The University, CWC, MDC, WWW, Tolland, and Manchester all operate Community water systems. A *Non-Transient Non-Community* (NTNC) water system is a public water system that regularly supplies water to at least 25 of the same people at least six months per year but not year-round. Some examples include schools, factories, office buildings, and hospitals that have their own water systems. A *Transient Non-Community* (TNC) water system is a public water system that provides water in a place such as a gas station, campground, or restaurant where people do not remain for long periods of time.

EPA further classifies water systems according to the service population. For example, the MDC is considered a "very large" water system because it services more than 100,001 people. The University, CWC, WWW, and Manchester are considered to be "large" water systems because they serve between 10,001 and 100,000 people. "Medium" water systems serve between 3,301 and 10,000 people. Tolland is considered to be a "small" water system because it services between 501 and 3,300 people. Very small water systems include more NTNC and TNC systems and service between 25 and 500 people.

Tables 4.5-8, 4.5-9, and 4.5-10 present the small and very small Community, NTNC, and TNC water systems located along potential pipeline routes. At this time, there are 14 small or very small Community water systems, 10 NTNC systems, and 30 TNC systems located along potential

pipeline routes. A new water main passing by these locations presents the opportunity for system redundancy or replacement of supply sources that may be inadequate in terms of water quantity or water quality.

TABLE 4.5-8
Small Community Water Systems Along Potential Pipeline Routes

Segment	Town	System	Service Population	Connections
2	Coventry	Twin Hills Water District	156	39
2	Coventry	CWC – General Water Division	306	115
2	Coventry	CWC – Pilgrim Hills Division	229	86
9	Tolland	Stone Pond Condominiums	141	47
11	Tolland	Norwegian Woods Apartments	252	84
13	Mansfield	Rockridge Condominiums	144	48
14 / 15	Mansfield	Renwood Condominiums	190	76
18	Mansfield	Jensen's Rolling Hills (CWC)	300	189
20	Mansfield	S&P Properties (Rosal Apartments)	42	21
30	Mansfield	CWC – Pinewoods Lane	68	18
35	Mansfield	Mansfield Village	40	15
39	Mansfield	Maplewood Apartments	153	52
40	Mansfield	CWC – Birchwood Heights	76	20
45	Mansfield	Knollwood Acres Apartments	312	186

TABLE 4.5-9
Non-Transient Non-Community Water Systems Along Potential Pipeline Routes

Segment	Town	System	Service Population	Connections
2	Bolton	Able Coil	50	1
2	Coventry	Meadowbrook Shopping Center	40	2
8	Tolland	70 Merrow Road (Subway)	60	2
10	Tolland	U.S. Department of Agriculture	36	1
17	Mansfield	Goodwin School	340	1
18	Mansfield	Mansfield Professional Park	100	4
20	Mansfield	Mansfield Shopping Center	30	9
25	Mansfield	Mt. Hope Montessori School	88	1
30	Mansfield	Southeast School	311	1
39	Mansfield	Mansfield Middle School	715	1

TABLE 4.5-10
Transient Non-Community Water Systems Along Potential Pipeline Routes

Segment	Town	System	Service Population	Connections
2	Bolton	1135 Boston Turnpike (Valero)	25	1
2	Bolton	Bolton Notch Plaza	25	1
2	Bolton	Bolton Professional Building	25	1
2	Bolton	St. George Episcopal Church	48	1
2	Bolton	U.S. Post Office	25	1
2	Bolton	United Methodist Church	35	1
2	Coventry	7-Eleven	25	1
2	Coventry	CVS Plaza	30	1
2	Coventry	Dunkin' Donuts	25	1
2	Coventry	Presbyterian Church of Coventry	25	1
2	Coventry	Storrs Community Church	25	1
4	Mansfield	Thompson's General Store	25	1
9	Tolland	Tolland Citgo	25	1
10	Tolland	404 Merrow Road (Sunoco)	33	1
10	Tolland	Agora Sandwich Shop	27	1
12A	Mansfield	Mansfield X-tra Mart	25	1
14	Mansfield	Holiday Mall	45	3
14 / 20	Mansfield	Public America	25	1
18	Mansfield	Yukon Jack's	25	1
20	Mansfield	603 Middle Turnpike (Market & Deli)	25	3
28	Mansfield	Mansfield Center General Store	25	1
28	Mansfield	Mansfield Restaurant Pizza & Pub	25	1
30	Mansfield	Mansfield Library Buchanan Center	217	1
33	Mansfield	Lions Park	25	1
34	Mansfield	First Church of Christ	25	1
35	Mansfield	Camp Holiday Hill	132	3
39	Mansfield	Bicentennial Park	25	1
40	Mansfield	Altnaveigh Inn & Restaurant	25	1
40	Mansfield	First Baptist Church	25	1
41	Mansfield	847 Stafford Road (Pub 32)	25	1

Note: Population is estimated for most systems; 25 is the benchmark for TNC system classification.

4.6 OTHER PUBLIC UTILITIES AND SERVICES

4.6.1 SANITARY SEWER

The towns of Bolton, Coventry, East Hartford, Manchester, Mansfield, South Windsor, Vernon, and Tolland each have wastewater treatment plants and/or sanitary sewer mains. This infrastructure is described below.

Town of Bolton

The Bolton Lakes Regional Water Pollution Control Authority (BLRWPCA) is currently in the process of installing an estimated $21.7 million sewer project in the vicinity of Bolton Lake. The

sewer project was spurred by a CT DEEP Consent Order requiring the installation of sewers to protect water quality in the Bolton Lakes. The water quality in the Bolton Lakes was deteriorating as a result of septic systems that were operating inefficiently due to being undersized, shallow groundwater, or poorly draining soils. In addition, septic systems in the area were often located very close to existing drinking water wells due to the small lot sizes.

At this time, sewer mains have been installed along Route 6 and Route 44 from the Manchester boundary to Bolton Notch and along Route 44 in the remainder of Bolton. Additional phases of work will focus on installing sewers in the neighborhoods adjacent to Bolton Lake in Bolton and Vernon. When completed, the sewer will direct flow via low pressure mains and gravity flow to the sanitary sewer system in Manchester.

Town of Coventry

The Town of Coventry operates a municipal sewer system in the vicinity of Wangumbaug (Coventry Lake). The Coventry Water Pollution Control Facility (WPCF) is located near Depot Road in Coventry and discharges to the Willimantic River downstream of any potential water source locations. According to Water Pollution Control Authority (WPCA) staff, the town has no plans to install sewers in the vicinity of Route 195 and Jones Crossing Road in the future. Sewers do not currently exist along the Route 44 corridor; properties are serviced by individual septic systems.

Special Planning Area 1 is located adjacent to Bolton and its ongoing sewer project. The 2010 *Plan of Conservation and Development* notes that the proximity of this sewer system presents the opportunity for Coventry to connect certain developments to this infrastructure. However, the town is encouraging the creation of "community septic systems" for developments within the other special planning areas. Such systems would combine septic flow from several businesses or properties and provide treatment in the most ideal area for the amount of flow.

Town of East Hartford

The Town of East Hartford has sanitary sewer mains along potential pipeline routes. Flow is directed to the East Hartford WPCF located on the Hockanum River near the Connecticut River.

Town of Manchester

The Town of Manchester has sanitary sewer mains adjacent to Interstate 84 and Interstate 384. Flow is directed to the Manchester WPCF located on the South Fork Hockanum River upstream of the Hockanum River.

Town of Mansfield/University of Connecticut

The University operates a WPCF on LeDoyt Road in the Storrs area of Mansfield. The service area includes the Main Campus, Depot Campus, and non-University properties surrounding the campuses, including privately owned apartment complexes, commercial properties, Town of Mansfield-owned properties, and the former Bergin Correctional Facility. Flow is directed by gravity and force main to the WPCF, which was last upgraded in 1995. The design capacity of the WPCF is 3.0 mgd for an average daily flow and 300,000 gallons for peak hourly flow.

Average daily flows at the WPCF typically average 27% to 44% (0.81 mgd to 1.32 mgd) of this average day capacity while peak flows can utilize up to 90% (270,000 gallons) of the plant's peak hourly capacity as a result of inflow and infiltration to the system. Outflow from the treatment plant is directed to the Willimantic River downstream of Eagleville Lake.

The Town of Mansfield has an agreement with the University to direct municipal sewer flows into the University system. Future sanitary sewer service areas include the University's committed demand areas such as the Technology Park and Storrs Center as well as the Mansfield Four Corners area. The 2007 *Water and Wastewater Master Plan* outlined additional areas that could someday connect to the sewer system, such as Knollwood Apartments on Route 275.

Mansfield Four Corners wastewater discharge estimates were published in the draft 2008 *Four Corners Area Wastewater Facilities Plan* prepared by Earth Tech, Inc. Existing septic flows at that time were approximately 47,000 gpd, with an increase to 170,000 gpd expected over the 20-year planning period. At present, wastewater is discharged to individual septic systems; however, these systems are problematic due to a high water table and poor soils for adsorption fields. A $5.1 million sewer extension is proposed to connect the Mansfield Four Corners area to the University WPCF. This connection will increase flows at the University WPCF immediately by 47,000 gpd and by 170,000 gpd over the 20-year planning period.

In addition to the University sewer system, the Town of Windham provides sewer service in southern Mansfield. The sewer service area is coincident with the water service area of WWW. Flows are directed to the Windham WPCF located in the lower section of the Natchaug River just upstream from the Shetucket River.

Town of South Windsor

The Town of South Windsor has sanitary sewer mains adjacent to Interstate 84. Flow is directed to the South Windsor WPCF located on Newberry Brook just upstream of the Connecticut River.

Town of Vernon/Town of Tolland

The Town of Vernon operates a sanitary sewer system that collects sewage from the majority of the developed properties within Vernon, including many properties located near Interstate 84. Flows are directed to the Vernon WPCF located on the Hockanum River.

The Town of Tolland operates a municipal sewer system in the vicinity of Route 195 and Interstate 84. This system connects the High School, the Route 195 corridor, the Town Center, and the Route 30/Route 74 business area near Vernon to the Vernon sanitary sewer system. Flows are directed to the Vernon WPCF via an intermunicipal agreement.

4.6.2 STORMWATER SYSTEMS, BRIDGES, AND CULVERTS

Stormwater systems serve portions of state and local roads in each of the towns under study. Typically, these systems are not physically extensive, and flow is directed to nearby outlets. Many are limited to a single cross culvert conveying flow beneath a roadway. Limited systems are available near watercourses on town roads in Mansfield. Many cross culverts and bridges are

located along the potential pipeline routes. Under most circumstances, the installation of water mains and pump stations can be designed to avoid interference with existing stormwater systems.

4.6.3 ENERGY, ELECTRICITY, AND NATURAL GAS

The majority of the areas under study include undeveloped lands, agricultural fields, and existing roadways. Energy consumption in these areas includes streetlights, vehicle fuel, and fuel consumed by agricultural equipment at certain wellfields and nearby farm fields. Adjacent energy consumption also occurs at existing buildings adjacent to the potential pipeline routes as a result of heating and cooling and electrical usage associated with lighting and equipment.

Electrical Service

Electric service (13.8 kilovolt) is provided by Connecticut Light and Power in the potential pipeline routes via a combination of overhead lines and underground cables. The University also operates a 25 megawatt co-generation facility at its Central Utility Plant (CUP) to provide backup electricity, steam, and chilled water for cooling. The CUP is fueled by natural gas provided by Connecticut Natural Gas with fuel oil as a backup.

The University has adopted a *Sustainable Design and Construction Policy* (March 2007) to provide a guideline for constructing and renovating buildings to be energy efficient. Such buildings are to utilize the Leadership in Energy & Environmental Design (LEED) Silver rating as a minimum performance requirement. As such, new buildings on campus are expected to be more energy efficient than non-LEED certified buildings of the same size.

Natural Gas Service

Connecticut Natural Gas provides natural gas service in Mansfield and to the University. Gas pipelines are located along the Route 44 and Route 195 corridors; Route 195 has an eight-inch diameter gas main. Local roads in Mansfield may also have gas pipelines. In addition, an underground gas transmission pipeline crosses Chaffeeville Road, Maple Road, and Route 195. Connecticut Natural Gas also provides service in East Hartford and Manchester.

Yankee Gas provides natural gas service in portions of Tolland, Vernon, and South Windsor. The towns of Coventry and Bolton are not served by natural gas.

Other Energy Sources

Other energy sources utilized within the potential pipeline routes include fuel oil for heating and gasoline for operation of vehicles. These energy sources are developed and processed outside of the study area and transported in by wholesalers for commercial resale by oil delivery companies and gas stations. Some nearby private residential properties utilize wood burning stoves during the winter and geothermal heating systems. In addition, the Depot Campus utilizes fuel cells and solar arrays at some of the newer buildings.

4.6.4 TELECOMMUNICATIONS SERVICE

Telephone service near potential pipeline routes is primarily provided by AT&T via overhead lines. Underground wires may serve some areas, such as in the vicinity of Bolton Notch and along Route 44. Digital telephone services are also offered by Charter Communications and Comcast. Cellular services are also available through a variety of providers.

The University's University Information Technology Services (UITS) provides telephone service on the University campus to all students, faculty, and staff. Cellular services are also available for faculty and staff.

Cable television service in the Mansfield area is provided by Charter Communications. UITS also offers its own cable service (HUSKYvision) in all residence halls, certain University-owned apartment complexes, and academic and administrative buildings on campus. These services are provided via both overhead and underground telecommunication lines. In addition to these services, satellite television providers also provide service to the area. In other areas, Cox Cable and Comcast provide cable television service via underground lines, and other providers also provide satellite television services.

4.7 TRAFFIC, PARKING, AND OTHER TRANSPORTATION

Roadways

Potential pipeline routes include state-owned and town-owned roadways and several off-road areas. The majority of the roadways are two lanes with a yellow dividing line. However, some of the alternatives include the creation of new water mains within or crossing interstate highways.

Mansfield has the largest concentration of potential pipeline routes within roadways. Traffic is most dense near the University and along its major arteries (Route 195 and Route 44) and near Interstate 84. Collector roads such as Route 275, Route 89, and Route 320 funnel traffic from residential areas to the main arteries. Local streets tend to be relatively less developed and often have residential side streets with dead ends.

Parking Areas

Large-scale parking areas are not typically available immediately adjacent to potential source sites or pipeline routes. Instead, parking is generally limited to that available for adjacent homes and businesses. The largest non-University parking areas adjacent to potential pipeline routes are located along Route 44 near the supermarket plaza and at the Big Y near WWW.

Some of the potential wellfield sites have nearby parking areas. For example, MD-3 is located in River Park, and MH-3 is located at Southeast Elementary School. These recreational areas have associated municipally owned parking areas. The remaining potential wellfield sites either require access improvements or are located on private property.

Other Transportation

In general, transportation modes have the most variety near the University. A large percentage of students either walk or bike to campus in addition to using shuttle buses. The campus utilizes bike lanes and an extensive sidewalk network to facilitate these transportation modes. Many off-campus students and staff also utilize personal vehicles. Some areas of Mansfield, such as Route 44, Birch Road, and Hunting Lodge Road, also have dedicated bikeways to encourage nonmotorized traffic. Public transportation is also available away from the University campus and the Route 195 corridor. However, the use of personal vehicles for transportation is very high in these areas.

The New England Central Railroad (formerly the Central Vermont Railway) runs parallel to Route 32 and the Willimantic River. This line runs from New London, Connecticut to Alburgh, Vermont and primarily provides daily freight service in Connecticut.

4.8 WETLAND RESOURCES

Extensive wetland resources exist in the potential project towns. State of Connecticut inland wetland soils include alluvium and floodplain soils and soils with a drainage classification of "poorly drained" or "very poorly drained." The current wetland soil mapping is represented by information contained in the Soil Survey Geographic (SSURGO) database for the State of Connecticut that is hosted in digital format by the CT DEEP. The soil data was last updated in 2009.

The CT DEEP has prepared general definitions of the types of wetland soils on its website. These are reprinted below:

- Alluvial and Floodplain soils occur along watercourses occupying nearly all level areas subject to periodic flooding. Such material can be composed of clay, silt, sand, or gravel. These soils range from being excessively drained to very poorly drained and, as such, some floodplain soils can be dry most of the year.

- Poorly drained soils occur where the water table is at or just below the ground surface usually during the late fall through early spring. The nearby landscape is typically nearly level or gently sloping.

- Very poorly drained soils generally occur on level land or in depressions. The water table lies at or above the surface during most of the growing season. Most marshes and bogs are located above these soils.

Soil/wetland scientists conducted field reconnaissance of wetlands along potential pipeline routes and at potential wellfield locations in November and December 2011 and in August 2012. Extensive analysis and formal wetland delineations were not conducted.

In general, direct wetland impacts will be avoided along potential pipeline routes through the use of directional drilling (beneath wetlands) or through the use of scaffolding to hang pipe from a bridge (over the wetlands with no footings within the wetland). Direct wetland impacts are most likely to occur due to pumping of new water supply wells.

4.9 BIOLOGICAL ENVIRONMENT

The biological environment surrounding the proposed alternatives consists of upland forests, agricultural fields, developed areas, forested wetlands, swamps, lakes, ponds, and watercourses. These features are often fragmented by developed areas including homes, roads, commercial and industrial zones, golf courses, and other types of development. The type and quality of habitat present varies with each alternative. The types of flora and fauna that are typically located in the vicinity of the potential alternatives, including endangered, threatened, and special concern species, are described below.

According to Degraaf and Yamasaki (2001), northeastern Connecticut lies within the Central Hardwoods – Hemlock – White Pine Forest Region of New England. This region is a mixture of hardwoods with American chestnut, red oak, black oak, white oak, hickory, gray birch, yellow birch, black birch, and beech being the major tree species. The primary conifers include white pine and hemlock. Red maple occurs throughout the region and forms nearly pure stands in wetter areas, and pitch pine can be found on sandy outwash areas.

In general, the mix of habitats provided by the forested wetlands, forested uplands, manicured green space, open meadows, trails, riparian corridors, and rights-of-way provide structural and floral diversity that is likely to attract a variety of wildlife species. Several habitat features can be found adjacent to potential pipeline routes. Nevertheless, the fragmented character of the majority of study areas combined with surrounding land uses result in a habitat that attracts edge-dwelling species while discouraging species typically associated with large stands of unbroken forest.

Table 4.9-1 lists information obtained from *New England Wildlife: Habitat, Natural History, and Distribution* published in 1995 detailing the dominant vegetation species generally found in upland forested areas such as those in northeastern Connecticut.

Table 4.9-1
Dominant Plant Species List for Upland Forest*

Scientific Name	Common Name
Trees	
Acer rubrum	red maple
Acer saccharum	sugar maple
Betula lenta	black birch
Carya glabra	pignut hickory
Carya ovata	shagbark hickory
Carya tomentosa	mockernut hickory
Prunus serotina	black cherry
Quercus alba	white oak
Quercus coccinea	scarlet oak
Quercur velutina	black oak
Quercus rubra	red oak
Sassafras albidum	sassafras
Shrubs and Vines	
Aralia nudicaulis	wild sarsaparilla
Berberis thunbergii	Japanese barberry
Gaylussacia sp.	huckleberry
Hamamelis virginiana	witch hazel
Rosa multiflora	multiflora rose
Rubus sp.	blackberry
Sambucus canadensis	elderberry
Toxicodendron radicans	poison ivy
Vaccinium sp.	lowbush blueberry
Vaccinium recognitum	northern arrowwood
Viburnum acerifolium	maple-leaf viburnum
Herbaceous Plants	
Aster sp.	aster
Lycopodium sp.	club moss
Maianthemum canadense	Canada mayflower
Various	various fern species

*Invasive species are included in this list although they may be undesirable

Table 4.9-2 is a list of wildlife species that, based on the habitat types present, are likely to occur adjacent to potential study areas. It should be noted that this list consists of species that have a strong potential to occur near the study area. It is not based on site-specific biological inventories.

Table 4.9-2
Potential Wildlife Species in the Study Area

Amphibians	marbled salamander (*Ambystoma opacum*) spotted salamander (*Ambystoma maculatum*) northern dusky salamander (*Desmognathus fusco*) redback salamander *(Plethodon cinereus)*	eastern American toad *(Bufo americanus)* northern spring peeper (*Hyla crucifer*) gray treefrog (*Hyla versicolor*) wood frog *(Rana sylvatica)*
Reptiles	eastern box turtle (*Terrapene carolina*) northern brown snake *(Storeria dekayi)* northern redbelly snake *(Storeria occipitomaculata*) eastern garter snake *(Thamnophis sirtalis)*	northern ringneck snake (*Diadophis punctatus*) northern black racer *(Coluber constrictor)* black rat snake (*Elaphe obsolete*)
Birds	red-tailed hawk (*Buteo jamaicensis*) ruffed grouse (*Bonasa umbellus*) wild turkey (*Meleagris gallopavo*) American woodcock (*Scolopax minor*) mourning dove (*Zenaida macroura*) eastern screech owl (*Otus asio*) great horned owl (*Bubo virginianus*) red-bellied woodpecker (*Melanerpes carolinus*) downy woodpecker *(Picoides pubescens)* hairy woodpecker (*Picoides villosus*) northern flicker (*Colaptes auratus*) eastern wood-pewee (*Contopus virens*) great crested flycatcher (*Myiarchus crinitus*) blue jay *(Cyanocitta cristata)* American crow *(Corvus brachyrhynchos)* black-capped chickadee *(Parus atricapillus)* tufted titmouse *(Parus bicolor)* white-breasted nuthatch *(Sitta carolinensis)* brown creeper (*Certhia americana*) Carolina wren (*Thryothorus ludovicianus*) house wren (*Troglodytes aedon*) blue-gray gnatcatcher (*Polioptila caerulea*) veery (*Catharus fuscescens*) wood thrush (*Hylocichla mustelina*) American robin (*Turdus migratorius*)	northern mockingbird (*Mimus polyglottos*) cedar waxwing (*Bombycilla cedrorum*) white-eyed vireo (*Vireo griseus*) red-eyed vireo *(Vireo olivaceus)* blue-winged warbler (*Vermivora pinus*) chestnut-sided warbler (*Dendroica pennsylvanica*) black and white warbler (*Mniotilta varia*) American redstart (*Setophaga ruticilla*) worm-eating warbler (*Helmitheros vermivorus*) ovenbird (*Seiurus aurocapillus*) northern waterthrush (*Seiurus noveboracensis*) common yellowthroat (*Geothlyois trichas*) scarlet tanager (*Piranga olivacea*) northern cardinal (*Cardinalis cardinalis*) rose-breasted grosbeak (*Pheucticus ludovicianus*) indigo bunting (*Passerina cyanea*) eastern towhee (*Pipilo erthrophthalmus*) chipping sparrow (*Spizella passerina*) field sparrow (*Spizella pusilla*) song sparrow (*Melospiza melodia*) brown-headed cowbird (*Molothrus ater*) Baltimore oriole (*Icterus galbula*) American goldfinch (*Carduelis tristis*) house sparrow (*Passer domesticus*) gray catbird (*Dumetella carolinensis*)
Mammals	Virginia opossum *(Didelphis virginiana)* masked shrew (*Sorex cinereus*) northern short-tailed shrew (*Blarina brevicauda*) little brown myotis (*Myotis lucifugus*) big brown bat (*Eptesicus fuscus*) eastern cottontail (*Sylvilagus floridanus*) eastern chipmunk (*Tamias striatus*) gray squirrel *(Sciurus carolinensis)*	southern flying squirrel (*Glaucomys volans*) white-footed mouse (*Peromyscus leucopus*) meadow vole (*Microtus pennsylvanicus*) coyote (*Canis latrans*) red fox (*Vulpes vulpes*) raccoon *(Procyon lotor)* striped skunk (*Mephitis mephitis*) white-tailed deer *(Odocoileus virginianus)*

Endangered, Threatened, and Special Concern Species

The Natural Diversity Database (NDDB) is maintained by the CT DEEP and records the general locations of species and natural communities collected over the last several decades by CT DEEP staff, scientists, conservation groups, and landowners. In some cases, data is derived from literature, museum records, and specimens.

The Connecticut Endangered Species Act was passed in 1989 with the goal of conserving, protecting, restoring, and enhancing endangered or threatened species and their essential habitat.

Species are listed according to their level of risk as defined by the CT DEEP below. The status of each species is reviewed every five years.

- Endangered Species means any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an "endangered species" pursuant to the federal Endangered Species Act.

- Threatened Species means any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the state and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the federal Endangered Species Act, except for such species determined to be endangered by the Commissioner in accordance with Section 4 of the Act.

- Species of Special Concern means any native plant species or any native nonharvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

The NDDB was contacted to determine if potential pipeline routes or new wellfield locations would have impacts to State-Listed species. Results are presented under the evaluation of each alternative[4]. The NDDB identified the State-Listed endangered, threatened, and special concern species near potential source locations and pipeline routes listed in Table 4.9-3

A brief description of these species is presented below based on information returned from the NDDB and information in the 2002 Mansfield Water Supply Plan (WSP):

- Grasshopper sparrows are small sparrows that inhabit grasslands and marshes. Their breeding habitat is open fields and prairies, and they forage on the ground in vegetation. This species was historically noted in the vicinity of the proposed Technology Park. Other areas where this species might occur include grassy fields such as fallow farm fields and undeveloped grassland with sparse shrub cover. This habitat occurs in clearings around:

    - Mansfield Hollow Lake including MH-2 and MH-3
    - Agricultural fields near Mansfield Depot and Stafford Road
    - Maple Road from Route 275 south to Mansfield Middle School
    - Fields between Storrs campus and Mansfield Four Corners

- Showy lady's slipper is a rare orchid historically noted in swamps and bogs in the Mansfield Four Corners area. It grows in calcareous wetlands, open wooded swamps, and fens.

[4] Does not include potential species along MDC pipeline routes (NDDB request submitted in August 2012) or for the Willimantic Reservoir (NDDB clarification request submitted March 2012). Responses are pending.

TABLE 4.9-3
State-Listed Species Identified by the NDDB

Common Name	Scientific Name	Status
Grasshopper sparrow	*Ammodramus savannarum*	Endangered
Showy lady's slipper	*Cypripedium reginae*	Endangered
Vesper sparrow	*Pooecetes gramineus*	Endangered
American kestrel	*Falco sparverius*	Threatened
Capillary pondweed	*Potamogeton pusillus ssp. gemmiparus*	Threatened
Dwarf huckleberry	*Gaylussacia dumosa var. bigeloviana*	Threatened
Frosted elfin moth	*Callophrys irus*	Threatened
Northern spring salamander	*Gyrinophilus porphyriticus*	Threatened
Aquatic snail	*Gyraulus circumstriatus*	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Special Concern
Eastern hognose snake	*Heterodon platirhinos*	Special Concern
Eastern meadowlark	*Sturnella magna*	Special Concern
One-sided pyrola	*Orthilia secunda*	Special Concern*
Purple milkweed	*Asclepias purpurascens*	Special Concern
Savannah sparrow	*Passerculus sandwichensis*	Special Concern
Southern bog lemming	*Synaptomys cooperi*	Special Concern
Wood turtle	*Glyptemys insculpta*	Special Concern

*Believed extirpated (locally extinct)

- Vesper sparrows are medium-sized sparrows that breed and nest in open grassy areas. This species was historically noted in the vicinity of the proposed Technology Park. This is a rare breeding species in Connecticut and is more common to the north. It utilizes habitat similar to the grasshopper and savannah sparrows. This habitat occurs in clearings around:

  - Mansfield Hollow Lake including MH-2 and MH-3
  - Agricultural fields near Mansfield Depot and Stafford Road
  - Maple Road from Route 275 south to Mansfield Middle School
  - Fields between Storrs campus and Mansfield Four Corners

- American kestrels typically begin nesting in late March to April in open areas such as woodland edges, parks, and open field habitat. Such habitat occurs in clearings around:

  - Mansfield Hollow Lake including MH-2 and MH-3
  - Agricultural fields near Mansfield Depot and Stafford Road
  - Maple Road from Route 275 south to Mansfield Middle School
  - Fields between Storrs campus and Mansfield Four Corners

  They are cavity nesters and seek out abandoned woodpecker or flicker holes to nest with a minimum cavity diameter of 30.5 centimeters. If American kestrels are nesting on or near a site, then work may not be conducted during the nesting season (February through July), and a significant buffer zone must be delineated around the nest to minimize disturbance.

- Capillary pondweed is found in Mansfield Hollow Reservoir. Best management practices must be utilized to minimize siltation and erosion into this water body during construction.

- Dwarf huckleberry has been historically noted in the Durham pond wetland off South Eagleville Road. This plant grows in dry or moist habitat types within forests, pine barrens, pine flatwoods, bogs, and bays.

- Frosted elfin moths are declining nationally due to their associated plant, *Lupinus perennis*, being negatively impacted. These moths are dormant from November 1 to April 1. *Lupinus perennis* is also known as Indian beet, Old maid's bonnets, Blue Lupine, and Sundial lupine and typically grows on sand hills. A lepidopterist should conduct surveys for the Frosted elfin moth in potentially affected areas (off-road areas where *Lupinus perennis* is found) prior to and during the construction period.

- Northern spring salamanders require cold, clean, well-oxygenated springs, brooks, or seepage areas. Their favored habitat is heavily forested and steep rocky ravines. Although not common in this region, such habitat occurs in several of the higher elevation areas of Chaffeeville Road, Gurleyville Road, the south end of Maple Road, Route 275, and the area north of the Willimantic River. Any activities that decrease the forest canopy (and therefore increase water temperature) would negatively impact this species. If work is conducted in any such habitat, a herpetologist familiar with the habitat requirements of this species should conduct surveys prior to and during the construction period.

- Aquatic snails have been found in Mansfield Hollow Reservoir. These species are sensitive to changes in dissolved oxygen, dissolved solids, and changes in water depth.

- Bobolinks were observed in the vicinity of North Campus during the Technology Park FEIS field studies. These blackbirds migrate to southern South America but breed in open grassy fields, especially hay fields, in North America. Areas where this species might occur include grassy fields such as fallow farm fields and undeveloped grassland. This habitat occurs in clearings around:

    - Mansfield Hollow Lake including MH-2 and MH-3
    - Agricultural fields near Mansfield Depot and Stafford Road
    - Maple Road from Route 275 south to Mansfield Middle School
    - Fields between Storrs campus and Mansfield Four Corners

- Eastern hognose snakes have been found in the vicinity of the Willimantic River Wellfield and around Mansfield Hollow. They prefer dry, sandy, well-drained soils. The snake feeds extensively on amphibians, preferably toads. Such habitat is common along the large river corridors with stratified-drift based soils. Searches for snakes should be conducted just prior to any construction work that may disturb these areas just prior to the installation of exclusion fencing. Hog nose snakes are active from late April to early October in most years.

- Eastern meadowlarks are medium-sized perching birds that breed in grasslands and prairies. This species has been historically seen in the vicinity of the proposed Technology Park but was not utilizing the area for breeding habitat. Other areas where this species might occur

include grassy fields such as fallow farm fields and undeveloped grassland. This habitat occurs in clearings around:

- Mansfield Hollow Lake including MH-2 and MH-3
- Agricultural fields near Mansfield Depot and Stafford Road
- Maple Road from Route 275 south to Mansfield Middle School
- Fields between Storrs campus and Mansfield Four Corners

- Purple milkweed has been historically seen in the dry to damp woods in the vicinity of Mansfield Depot. The plant typically prefers sun to partial shade conditions and moist to average soil conditions.

- One-sided pyrola was historically seen in the dry to damp woods in the vicinity of Mansfield Depot. This wildflower grows in moist coniferous woods but is believed to no longer exist in Connecticut.

- Savannah sparrows nest in open, grassy areas. Its breeding season lasts from April through August, and it is the most sensitive during this period to habitat disturbances. It was noted in the Technology Park FEIS as being previously seen in the vicinity of the proposed Technology Park. Work should therefore be conducted between September through March if this species is nesting on a work site. Other areas where this species might occur include grassy fields such as fallow farm fields and undeveloped grassland. This habitat occurs in clearings around:

  - Mansfield Hollow Lake including MH-2 and MH-3
  - Agricultural fields near Mansfield Depot and Stafford Road
  - Maple Road from Route 275 south to Mansfield Middle School
  - Fields between Storrs campus and Mansfield Four Corners

- Southern bog lemmings were historically noted in the vicinity of North Eagleville Road. They are typically found in mixed forests, wetlands, and grasslands and are active year-round, mainly at night.

- Wood turtles require riparian habitats bordered by floodplain, woodland, or meadows. They hibernate in the banks of rivers in submerged tree roots. Their summer habitat includes pastures, old fields, woodlands, power line cuts, and railroad beds bordering or adjacent to streams and rivers. Such habitat is common along the larger river corridors including the Fenton River, Willimantic River, and Skungamaug River. During the summer and fall, the following guidelines must be followed during construction in areas near wood turtle habitat:

  - Silt fencing must be installed around the work area prior to construction.
  - A sweep of the area must be performed following the installation of the silt fencing to look for turtles.
  - Workers must be apprised of the possible presence of turtles and given a description of such species.
  - Any turtles discovered must not be harmed and must be moved immediately to an area outside of the fenced area and positioned in the same direction it was walking.
  - No vehicles or heavy machinery may be parked in any turtle habitat.

- Work conducted during the early morning or evening hours may occur with special care not to harm basking or foraging turtles.
- All silt fencing must be removed at the completion of construction once soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.

Prior to construction, a biological survey will need to be performed in the vicinity of any areas recorded by the NDDB to determine the presence of endangered, threatened, or special concern species such that project timing and/or buffer distances can be established to protect these species from any construction impacts.

4.10 INLAND FISHERIES

Fenton River

The Fenton River is designated as a Class III Wild Trout Management Area by CT DEEP. DEEP conducted a fisheries survey in the Fenton River in July 1994 just upstream from the Fenton River Wellfield. As noted in the 2006 *Fenton River Study*, the most abundant species sampled included (listed in descending order of abundance) blacknose dace, white sucker, fallfish, and tessellated darter. Wild brook trout and brown trout were also collected but were less abundant.

Ten subreaches were delineated for the purpose of fish collection during the Fenton River Study. These subreaches ranged from just above the Fenton River Wellfield to the Fenton River's confluence with Mansfield Hollow Lake. Fish collection was performed at each location in July and August 2003. A total of 523 plots were fished during the data collection period resulting in the capture of 3,402 fish from 17 taxa. The overall fish abundance of the river between the Fenton River Wellfield and Mansfield Hollow Lake was calculated as being 1.08 fish per square meter. Results originally presented as Table 5.2 of the Fenton River Study are presented in Table 4.10-1. These are the most recently published data for the river.

The most abundant species collected were blacknose dace (45.6%), brown trout (12.7%), bluegill (8.2%), fallfish (7.3%), and white sucker (7.1%). While the river is dominated by blacknose dace, the river provides habitat to a good diversity of species. The CT DEEP occasionally stocks brown trout and brook trout in the Fenton River.

The University withdraws water from the Fenton River Wellfield for public water supply. As shown in the 2006 *Fenton River Study*, these withdrawals result in less recharge to the river as well as induced infiltration from the river into the aquifer. The reduction in instream flow was found to have an impact on fish habitat during periods of low streamflow. Water withdrawn from the Fenton River aquifer (basin #3207) is utilized in the Fenton River basin and the Willimantic River basin (#3100). As the University sewer system eventually discharges to the Willimantic River, withdrawals from the Fenton River aquifer constitute an interbasin transfer of water.

TABLE 4.10-1
Number of Fish Captured (All Age Classes Combined) in the Fenton River, July – August 2003

Common Name	Scientific Name	Total	Percent
Blacknose dace	*Rhinichthys atratulus*	1,551	45.6
Brown trout	*Salmo trutta*	431	12.7
Bluegill	*Lepomis macrochirus*	278	8.2
Fallfish	*Semotilus corporalis*	248	7.3
White sucker	*Catastomus commersoni*	241	7.1
Pumpkinseed	*Lepomis gibbosus*	189	5.6
Tessellated darter	*Etheostoma olmstedi*	133	3.9
Common shiner	*Luxilus cornutus*	132	3.9
Largemouth bass	*Micropterus salmoides*	104	3.1
Golden shiner	*Notemigonus crysoleucas*	34	1.0
Brook trout	*Salvelinus fontinalis*	23	0.7
Northern pike	*Esox lucius*	10	0.3
Yellow perch	*Perca flavescens*	7	0.2
Green sunfish	*Lepomis cyanellus*	6	0.2
Chain pickerel	*Esox niger*	5	0.1
Yellow bullhead	*Ameiurus natalis*	1	<0.1
Smallmouth bass	*Micropterus dolomieu*	1	<0.1
Total taxa		17	
Total specimens		3,402	

Mansfield Hollow Lake

Fisheries data for Mansfield Hollow Lake were obtained from *A Fisheries Guide to Lakes and Ponds in Connecticut* (2002). The CT DEEP manages the lake as a Bass Management Lake and stocks it annually with northern pike fingerlings. The lake receives inflow from three heavily stocked trout streams (the Fenton River, the Mount Hope River, and the Natchaug River). Thus, moderate amounts of brook trout and brown trout navigate to the lake. Table 4.10-2 presents the relative abundance of fish species found in Mansfield Hollow Lake based on the 2002 guide.

The surface elevation of the lake is maintained by the U.S. Army Corps of Engineers (USACE) at Mansfield Hollow Dam although the actual water surface elevation can fluctuate considerably due to the flood-control function of the reservoir. Lake levels are typically only drawn down considerably for dam maintenance. The depth of water in the lake ranges from zero to 12 feet upstream of Bassetts Bridge Road and ranges from zero to 21 feet downstream of Bassetts Bridge Road.

The 2001 report *An Instream Flow Study of the Natchaug River from the Willimantic Reservoir to the Willimantic River* discussed the feasibility of storing additional water in Mansfield Hollow Lake for public water supply or stream augmentation. The USACE confirmed that Mansfield Hollow Lake, as a flood-control reservoir, was not operated for low-flow augmentation or water supply releases. The USACE further noted that under normal conditions inflow to the reservoir is equal to outflow. A permanent change to the USACE operating plan would be very difficult to

achieve as it would require new congressional authorization to amend the original authorization (Flood Control Act, August 18, 1941, Public No. 228, 77th Congress). The Natchaug River is discussed further below.

TABLE 4.10-2
Fish Species and Abundance in Mansfield Hollow Lake

Common Name	Scientific Name	Abundance
American eel	*Anguilla rostrata*	Uncommon
Banded killifish	*Fundulus diaphanus*	Common
Black crappie	*Pomoxis nigromaculatus*	Common
Bluegill	*Lepomis macrochirus*	Common
Brook trout	*Salvelinus fontinalis*	Uncommon
Brown bullhead	*Ameiurus nebulosus*	Uncommon
Brown trout	*Salmo trutta*	Uncommon
Chain pickerel	*Esox niger*	Common
Common shiner	*Luxilus cornutus*	Uncommon
Fallfish	*Semotilus corporalis*	Uncommon
Golden shiner	*Notemigonus crysoleucas*	Abundant
Green sunfish	*Lepomis cyanellus*	Uncommon
Largemouth bass	*Micropterus salmoides*	Common
Northern pike	*Esox lucius*	Common
Pumpkinseed	*Lepomis gibbosus*	Common
Rainbow trout	*Oncorhynchus mykiss*	Uncommon
Redbreast sunfish	*Lepomis aurites*	Uncommon
Smallmouth bass	*Micropterus dolomieu*	Uncommon
Spottail shiner	*Notropis hudsonius*	Abundant
Tessellated darter	*Etheostoma olmstedi*	Uncommon
White sucker	*Catastomus commersoni*	Abundant
Yellow bullhead	*Ameiurus natalis*	Uncommon
Yellow perch	*Perca flavescens*	Common

Natchaug River

The Connecticut DEEP maintains a Trout Park along the Natchaug River in Eastford and also stocks the Natchaug River each spring along several sections in Eastford, Chaplin, and Windham both upstream and downstream of the Willimantic Reservoir. The CT DEEP notes that this river is heavily fished.

The Town of Windham conducted an in-stream flow study in the mid 1990s that resulted in the 1995 report entitled *An Instream Flow Study of the Natchaug River from the Willimantic Reservoir to the Willimantic River*. The study was later amended in 2002 as part of a diversion permit application. The study notes that electrofishing was conducted by the CT DEEP in the Natchaug River at five locations during September 1993 and July 1994. The electrofishing yielded a total of 21 taxa of fish although the exact count was not reported. The most abundant species collected reportedly included white sucker, bluegill sunfish, fallfish, and tessellated

darter. Uncommon species included black crappie, yellow bullhead, golden shiner, spottail shiner, blacknose dace, and northern pike. Brown trout was not found, but this was explained by the CT DEEP as being due to the fact that deep pools (optimal brown trout habitat) were not sampled during this survey. Results are presented in Table 4.10-3.

TABLE 4.10-3
Fish Collected in the Natchaug River by the CT DEEP, September 1993 and July 1994

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Black crappie	*Pomoxis nigromaculatus*
Blacknose dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Carp	*Cyprinus carpio*
Chain pickerel	*Esox niger*
Common shiner	*Luxilus cornutus*
Fallfish	*Semotilus corporalis*
Golden shiner	*Notemigonus crysoleucas*
Largemouth bass	*Micropterus salmoides*
Longnose dace	*Rhinichthys cataractae*
Northern pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
Redbreast sunfish	*Lepomis aurites*
Rock bass	*Ambloplites rupestris*
Smallmouth bass	*Micropterus dolomieu*
Spottail shiner	*Notropis hudsonius*
Tessellated darter	*Etheostoma olmstedi*
White sucker	*Catastomus commersoni*
Yellow bullhead	*Ameiurus natalis*
Yellow perch	*Perca flavescens*

CT DEEP performed a fishery survey of the Natchaug River in Chaplin, Connecticut in June 2008 and August 2009. Results are summarized in Table 4.10-4. This location is upstream of Mansfield Hollow Lake. A total of 89 fish was collected between the two surveys. Fallfish, bluegill, and pumpkinseed were the most abundant species.

Flows in the Natchaug River are regulated by releases from Mansfield Hollow Dam. The 1995 *Instream Flow Study* report recommends a 20 cfs minimum flow to be released from the Willimantic Reservoir. The 1995 report also notes that the Federal Energy Regulatory Commission (FERC) permit for the Mansfield Hollow Lake Dam requires a 25 cfs minimum flow release rate although it notes that USACE may reduce the outflow rate to 15 cfs for flood management. This discharge rate is likely acceptable to fisheries resources during flooding since watershed drainage downstream of the dam will augment discharge, and the reduction in flood flows will prevent the loss of habitat typically seen at higher flows for most species. The CT DEEP notes that the USACE operates the Mansfield Hollow Dam out of its office in Thompson, Connecticut and therefore does not manage releases beyond its own maintenance and permit concerns.

TABLE 4.10-4
Fish Collected in the Natchaug River by the CT DEEP, June 2008 and August 2009

Common Name	Scientific Name	June 2008 Sample	August 2009 Sample	Total	Percentage
Fallfish	*Semotilus corporalis*	14	13	27	30.3%
Bluegill	*Lepomis macrochirus*	11	6	17	19.1%
Pumpkinseed	*Lepomis gibbosus*	3	9	12	13.5%
Redbreast sunfish	*Lepomis aurites*	7	0	7	7.9%
Yellow bullhead	*Ameiurus natalis*	6	0	6	6.8%
Smallmouth bass	*Micropterus dolomieu*	3	2	5	5.6%
White sucker	*Catastomus commersoni*	0	4	4	4.5%
Tessellated darter	*Etheostoma olmstedi*	0	3	3	3.4%
Brown trout	*Salmo trutta*	0	2	2	2.3%
Largemouth bass	*Micropterus salmoides*	1	1	2	2.3%
Rainbow trout	*Oncorhynchus mykiss*	0	1	1	1.1%
Chain pickerel	*Esox niger*	0	1	1	1.1%
American eel	*Anguilla rostrata*	0	1	1	1.1%
Yellow perch	*Perca flavescens*	1	0	1	1.1%
Total taxa		8	11	14	
Total specimens		46	43	89	

WWW withdraws water from the Willimantic Reservoir on the Natchaug River for public water supply. As noted in the 1995 *Instream Flow Study*, these withdrawals directly reduce instream flow and have an impact on fish habitat during periods of low streamflow. Water withdrawn from the Natchaug River basin (basin #3200) is utilized in the Natchaug River basin, the Sawmill Brook drainage basin (#3208), the Willimantic River basin (#3100), and the Shetucket River basin (#3000). As the Windham WPCF eventually discharges to the Shetucket River at the confluence of the Natchaug River and the Willimantic River, withdrawals from the Natchaug River aquifer constitute a relatively minor interbasin transfer of water since the water (minus the fraction lost from outdoor uses) is returned downstream.

Willimantic River

The Willimantic River is a listed as a Connecticut Trout Management Area maintained by the CT DEEP. The CT DEEP notes that the Willimantic River has a good diversity of fluvial species. As noted in the *Willimantic River Study* (2010), electrofishing was conducted by the Connecticut DEEP at two locations in the Willimantic River in July 1994. The electrofishing performed near the Willimantic River Wellfield and upstream of Depot Road in Coventry yielded a total of 1,676 specimens of 23 taxa of fish and evidenced a mix of fluvial specialist, fluvial dependent, and macrohabitat generalist species. Results are presented in Table 4.10-5.

TABLE 4.10-5
Fish Collected in the Willimantic River by the CT DEEP, July 1994

Common Name	Scientific Name	Near UConn Well #4	Upstream of Depot Road in Coventry	Total	Percent
Fallfish	*Semotilus corporalis*	158	273	431	25.7
Common shiner	*Luxilus cornutus*	140	196	336	20.0
White sucker	*Catastomus commersoni*	176	137	313	18.7
Redbreast sunfish	*Lepomis aurites*	127	30	157	9.4
Smallmouth bass	*Micropterus dolomieu*	75	72	147	8.8
Blacknose dace	*Rhinichthys atratulus*	65	2	67	4.0
Yellow perch	*Perca flavescens*	31	11	42	2.5
Pumpkinseed	*Lepomis gibbosus*	30	3	33	2.0
Tessellated darter	*Etheostoma olmstedi*	6	20	26	1.6
Spottail shiner	*Notropis hudsonius*	0	23	23	1.4
Golden shiner	*Notemigonus crysoleucas*	0	19	19	1.1
Unidentified minnow	*Cyprinidae*	14	0	14	0.8
Largemouth bass	*Micropterus salmoides*	11	2	13	0.8
Rock bass	*Ambloplites rupestris*	0	12	12	0.7
American eel	*Anguilla rostrata*	7	4	11	0.7
Sunfish hybrid	*Lepomis* hybrid	10	0	10	0.6
Chain pickerel	*Esox niger*	2	6	8	0.5
Green sunfish	*Lepomis cyanellus*	1	5	6	0.4
Bluegill	*Lepomis macrochirus*	1	2	3	0.2
Brown bullhead	*Ameiurus nebulosus*	0	2	2	0.1
Brown trout	*Salmo trutta*	0	1	1	0.1
Grass pickerel	*Esox americanus vemiculatus*	1	0	1	0.1
Unidentified sunfish	*Lepomis* spp.	0	1	1	0.1
Total taxa		17	20	23	
Total specimens		855	821	1676	

The most abundant species collected were fallfish (25.7%), common shiner (20.0%), white sucker (18.7%), redbreast sunfish (9.4%), and smallmouth bass (8.8%). A single brown trout was collected in these samples. The CT DEEP stocks brown trout and brook trout (*Salvelinus fontinalis*) in the Willimantic River although it is unlikely that these species reproduce in the river (Brian Murphy, Connecticut DEEP, personal communication).

CT DEEP performed a fish survey at Depot Road in Coventry, Connecticut in August 2009. Many species were conspicuously absent despite good field conditions. A total of 12 taxa and 51 specimens were sampled. Results are presented in Table 4.10-6.

TABLE 4.10-6
Fish Collected in the Willimantic River at Depot Road
in Coventry by the CT DEEP, August 2009

Common Name	Scientific Name	Number Collected	Percent
Fallfish	*Semotilus corporalis*	18	35.3%
Common shiner	*Luxilus cornutus*	12	23.5%
Redbreast sunfish	*Lepomis aurites*	6	11.7%
Chain pickerel	*Esox niger*	4	7.8%
White sucker	*Catastomus commersoni*	2	3.9%
Smallmouth bass	*Micropterus dolomieu*	2	3.9%
Tessellated darter	*Etheostoma olmstedi*	2	3.9%
Blacknose dace	*Rhinichthys atratulus*	1	2.0%
Yellow bullhead	*Ameiurus natalis*	1	2.0%
Brown trout	*Salmo trutta*	1	2.0%
Bluegill	*Lepomis macrochirus*	1	2.0%
Largemouth bass	*Micropterus salmoides*	1	2.0%
Total taxa		12	
Total specimens		51	

Most recently, CT DEEP performed a fish survey at three locations along the Willimantic River on July 12, 2011. This sample collected 17 taxa and yielded 502 specimens. Fallfish, common shiner, white sucker, and tessellated darter were the most abundant species. Results are presented in Table 4.10-7.

The University withdraws water from the Willimantic River Wellfield for public water supply. As shown in the 2010 *Willimantic River Study*, these withdrawals result in less groundwater discharge to the river as well as induced infiltration from the river into the aquifer. The reduction in instream flow was found to have an impact on fish habitat during periods of low streamflow. Water withdrawn from the Willimantic River aquifer (basin #3100) is utilized in the Fenton River basin (#3207) and the Willimantic River basin. As the University sewer system eventually discharges to the Willimantic River, withdrawals from the Willimantic River aquifer constitute a relatively minor interbasin transfer of water.

TABLE 4.10-7
Fish Collected in the Willimantic River at Route 74, Willimantic River Wellfield, and Depot Road in Coventry by the CT DEEP, July 2011

Common Name	Scientific Name	Number Collected	Percent
Fallfish	*Semotilus corporalis*	165	32.9%
Common shiner	*Luxilus cornutus*	151	30.1%
White sucker	*Catastomus commersoni*	48	9.5%
Tessellated darter	*Etheostoma olmstedi*	39	7.7%
Pumpkinseed	*Lepomis gibbosus*	25	5.0%
Bluegill	*Lepomis macrochirus*	22	4.4%
Blacknose dace	*Rhinichthys atratulus*	18	3.6%
Green sunfish	*Lepomis cyanellus*	6	1.2%
Yellow perch	*Perca flavescens*	5	1.0%
Redbreast sunfish	*Lepomis aurites*	5	1.0%
Rainbow trout	*Oncorhynchus mykiss*	4	0.8%
Smallmouth bass	*Micropterus dolomieu*	3	0.6%
Brown trout	*Salmo trutta*	3	0.6%
Largemouth bass	*Micropterus salmoides*	3	0.6%
American eel	*Anguilla rostrata*	2	0.4%
Chain pickerel	*Esox niger*	2	0.4%
Yellow bullhead	*Ameiurus natalis*	1	0.2%
Total taxa		17	
Total specimens		502	

Shenipsit Reservoir/Hockanum River

The Shenipsit Reservoir is a major water supply reservoir located in the headwaters of the Hockanum River. CWC withdraws water from the Shenipsit Reservoir for public water supply. This water is used throughout the Northern Operations Western System, constituting an interbasin transfer of water.

CWC provides cold bottom-water releases from Shenipsit Reservoir to the Hockanum River. Currently, CWC releases 0.2 cubic feet per second per square mile (csm) year-round, with a spring freshet in early March of 2.3 csm. This is equivalent to a year-round discharge of 3.26 cfs and a freshet release of 37.5 cfs. The CT DEEP notes that these cold bottom-water releases help make the Hockanum River an excellent fisheries resource. Public fishing access is limited to shore fishing from the north side of the reservoir, and boat fishing access is limited to a private boat livery.

Fisheries data for Shenipsit Reservoir were obtained from *A Fisheries Guide to Lakes and Ponds in Connecticut* (2002). The CT DEEP stocks the reservoir annually with catchable-size brown and rainbow trout. Table 4.10-8 presents the relative abundance of fish species found in Shenipsit Reservoir based on the 2002 guide.

TABLE 4.10-8
Fish Species and Abundance in Shenipsit Reservoir

Common Name	Scientific Name	Abundance
American eel	*Anguilla rostrata*	Uncommon
Banded killifish	*Fundulus diaphanus*	Uncommon
Black crappie	*Pomoxis nigromaculatus*	Common
Bluegill	*Lepomis macrochirus*	Common
Brown bullhead	*Ameiurus nebulosus*	Uncommon
Brown trout	*Salmo trutta*	Common
Chain pickerel	*Esox niger*	Uncommon
Golden shiner	*Notemigonus crysoleucas*	Common
Largemouth bass	*Micropterus salmoides*	Abundant
Pumpkinseed	*Lepomis gibbosus*	Uncommon
Rainbow trout	*Oncorhynchus mykiss*	Common
Rock bass	*Ambloplites rupestris*	Common
Smallmouth bass	*Micropterus dolomieu*	Abundant
Spottail shiner	*Notropis hudsonius*	Uncommon
White sucker	*Catastomus commersoni*	Abundant
White perch	*Morone americana*	Common
Yellow perch	*Perca flavescens*	Uncommon

The Hockanum River is a year-round catch and release stream. It is managed by the CT DEEP as a Trout Management Area. DEEP notes that wild brown trout can be found in the river and that the river is a valuable fisheries resource. DEEP recently performed a fishery survey of the Hockanum River in late July 2011. A total of 801 fish were collected over two days. White sucker, longnose dace, blacknose dace, and fallfish were the most abundant species. Results are presented in Table 4.10-9. DEEP also performed a trout survey in September 2011. Five wild brook trout, 81 wild brown trout, one stocked rainbow trout, and one wild tiger trout were collected.

TABLE 4.10-9
Fish Collected in the Hockanum River by the CT DEEP in Late July 2011

Common Name	Scientific Name	July 25, 2011 Sample	July 26, 2011 Sample	Total	Percentage
White sucker	*Catastomus commersoni*	215	8	223	27.8%
Longnose dace	*Rhinichthys cataractae*	73	130	203	25.3%
Blacknose Dace	*Rhinichthys atratulus*	69	28	97	12.1%
Fallfish	*Semotilus corporalis*	87	0	87	10.9%
Tessellated darter	*Etheostoma olmstedi*	45	22	67	8.4%
American eel	*Anguilla rostrata*	34	4	38	4.7%
Bluegill	*Lepomis macrochirus*	21	2	23	2.9%
Brown trout	*Salmo trutta*	15	3	18	2.2%
Common shiner	*Luxilus cornutus*	3	13	16	2.0%
Spottail Shiner	*Notropis hudsonius*	0	7	7	0.9%
Largemouth bass	*Micropterus salmoides*	4	2	6	0.8%
Pumpkinseed	*Lepomis gibbosus*	4	0	4	0.5%
Yellow perch	*Perca flavescens*	3	1	4	0.5%
Rock bass	*Ambloplites rupestris*	3	0	3	0.4%
Smallmouth bass	*Micropterus dolomieu*	2	0	2	0.3%
Brook trout	*Salvelinus fontinalis*	1	0	1	0.1%
Brown bullhead	*Ameiurus nebulosus*	1	0	1	0.1%
Rainbow trout	*Oncorhynchus mykiss*	0	1	1	0.1%
Total taxa		16	12	18	
Total specimens		580	221	801	

Farmington River

Water resource conflicts in the Farmington River basin have been the subject of much study with regard to resolving water use and allocation conflicts. An *Instream Flow Study* of the West Branch and Main Stem of the Farmington River was conducted from 1989 to 1992. The goal of the study was to determine the river flows needed to maintain adequate fish habitat and recreational and scenic resources. Additionally, the study assessed whether flow conditions in the West Branch allow for water withdrawals, particularly under varying rainfall scenarios.

The *Instream Flow Study* determined the optimum and minimum streamflow rates required for supporting multiple uses of the river. Subsequently, the Upper Farmington River Management Plan was issued in 1993, and portions of the river were designated as a federal Wild and Scenic River in 1995. The Metropolitan District, CT DEEP, Farmington River Watershed Association, and National Park Service were involved in this process together, along with local municipalities.

The *Instream Flow Study* and related studies concluded that in addition to the authorized withdrawals from the East Branch Farmington River and Nepaug River the West Branch Reservoirs and the Still River could provide ample water for downstream users while allowing use of 20 mgd from the West Branch for public water supply under all but the 99% exceedance

drought. This study assumed 100% allocation of the East Branch Farmington River and Nepaug River for water supply and, therefore, negligible contribution to instream flows.

The Farmington River's diverse aquatic habitats and high water quality support 37 native and introduced species of fish (Farmington Wild and Scenic River Study, 1995). The reproduction of brown, brook, and rainbow trout has been the focus of fisheries management in the Farmington River. Fisheries management has also focused upon the reintroduction of Atlantic salmon to the Connecticut section of the Farmington River. Recreational fishing is very popular in the Farmington River, particularly the fishing of stocked trout.

Aside from being "*the most heavily stocked stream in Connecticut*," the Farmington River is "*one of the few remaining unpolluted trout streams in southern New England*" (Farmington Wild and Scenic River Study, 1995). Approximately 28,000 trout are stocked annually in the Connecticut portion of the Farmington River, and the Massachusetts segment is filled with an additional 9,400 trout.

The Farmington River system in Connecticut also provides some of the most critical habitat in southern New England for the restoration of anadromous fish, particularly Atlantic salmon (Farmington Wild and Scenic River Study, 1995). Of the entire 11,250-square-mile watershed of the Connecticut River, the Farmington River provides 9% of the salmon nursery habitat. Long-term research and restoration programs have been made possible for the Farmington River's hatcheries and fish passageways as a result of the efforts of numerous private and government organizations.

Since 1976, juvenile salmon have been released in the Farmington River. Some adult salmon are captured near the mouth of the river in Windsor and then transported to holding ponds along the West Branch for spawning and hatching. Fry and smolts are released into the tributaries and lower sections of the river for downstream migration. The high survival and growth rates hint that the Farmington River may be capable of supporting natural reproduction. Experts estimate that a natural spawning population of 770 adult salmon can be maintained within the river in conjunction with a yearly sport harvest of 255 salmon. The U.S. Fish and Wildlife Service has approximated that the population of spawning fish could be developed through the release of 100,000 to 300,000 salmon yearly to the river's basin for at least four consecutive years (Farmington Wild and Scenic River Study, 1995).

Fish passage facilities at the main dams are important in regard to the long-term success of the restoration program. A fish ladder has been constructed at Rainbow Basin, and a downstream passage facility has been established by the Farmington River Power Company.

According to the Upper Farmington River Management Plan, fish passage is critical to the reestablishment of anadromous fish to the Farmington River. However, the two dams in Collinsville are devoid of fish passage facilities. The Upper Farmington River Management Plan recommends that fish passage needs should be considered in any future FERC licensing of the Collinsville dams.

Since 1960, cold water has been released from the bottom of the West Branch Reservoir, which consequently creates a favorable habitat for the Atlantic salmon and trout. The release of water in the summer and early fall prolongs the trout and salmon season by creating levels of cold water

that are actually higher than those found in nature. Due to this process, the number of fish is preserved and maintained, and it is possible to continue the DEEP's stocking program throughout the summer season. According to the State of the Farmington River Watershed Report, the effect of the cold water releases is believed to extend as far as Collinsville.

4.11 WATER QUALITY AND STORMWATER MANAGEMENT

The State of Connecticut has set forth a policy for the management of water quality through the Water Quality Standards (most recently updated February 2011), wherein criteria and a classification system are applied to all surface water and groundwater resources in the state. These standards act in concert with the principles of Connecticut's Clean Water Act. These classifications establish designated uses for surface and groundwater resources and identify the criteria necessary to support those uses. Criteria have been established with respect to desirable use, antidegradation, allowable types of discharges, waste assimilation, and a variety of physical and chemical constituents.

Federal law prohibits a state from diminishing surface water quality classifications or standards in order to accommodate new or increased wastewater discharges or land use practices that impact a particular watercourse. Therefore, the state must attain and maintain the most sensitive existing and potential use for a respective water body.

4.11.1 SURFACE WATER RESOURCES

Potential supply sources and pipeline routing lie within a variety of subregional watersheds as enumerated by the CT DEEP. Subregional watersheds that are associated with the identified alternatives include the following:

- Willimantic River (basin #3100)
- Skungamaug River (basin #3106)
- Hop River (basin #3108)
- Natchaug River (basin #3200)
- Fenton River (basin #3207)
- Sawmill Brook (basin #3208)
- Connecticut River (basin #4000)
- Podunk River (basin #4004)
- Salmon Brook (basin #4006)
- Hockanum River (basin #4500)
- Tankerhoosen River (basin #4503)
- South Fork Hockanum River (basin #4504)

Potential pipeline segments also intersect smaller named and unnamed streams and watercourses along potential pipeline routes. Specific drainage basins and streams are identified under the evaluation of each alternative.

The CT DEEP maintains water quality classifications for surface waters in the state. These classifications have been applied based on criteria presented in the 2011 *Water Quality Standards*. Surface water quality in the vicinity of potential source sites or pipeline routes range

from Class C to Class AA as noted below. Many of the stream segments are designated with two classifications, with the latter classification indicative of the long-term water quality goal for that stream segment. Designated uses of surface water for the defined water quality classifications include:

- Class AA surface waters are designated for existing or proposed drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, and water supply for industry and agriculture.

- Class A surface waters are designated for habitat for fish and other aquatic life and wildlife, potential drinking water supplies, recreation, navigation, and water supply for industry and agriculture.

- Class B surface waters are designated for habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply.

- Class C surface waters indicate that the water quality is impaired, and the state's goal is to improve the water quality to either a B, A, or AA designation.

Table 4.11-1 lists streams in the study area that are of particular note for having poor surface water quality. The second letter designation is the state's water quality goal for that watercourse. The remaining streams within the study area have water quality that is listed as either A or AA quality.

TABLE 4.11-1
Areas with Reduced Surface Water Quality

Name	Pipeline Segments	Water Quality
Hockanum River	7	C / B
Skungamaug River	2, 9	B / A
Willimantic River	2, 12A, 12B	B
Cedar Swamp Brook	55	B / A
Eagleville Brook	51, 52, 54	B / A
Fenton River	31, 35, 36	B / AA
Mansfield Hollow Reservoir	23, 31	B / AA
Willimantic Reservoir	12	B / AA

The CT DEEP prepares a list of impaired water bodies in the state for the federal Environmental Protection Agency approximately every three years. The most recent update was in 2011. Table 4.11-2 presents the results of the assessment for streams in the study area that contribute to water supply sources associated with project alternatives.

Finally, the Connecticut DPH completed Source Water Assessment reports evaluating all public water supply sources in Connecticut in 2003. Each report rated the overall susceptibility of the public water system source to pollution as presented in Table 4.11-3. Note that the susceptibility of a source to pollution does not necessarily imply poor water quality.

TABLE 4.11-2
Connecticut 305b Assessment Results for Streams in the Study Area that Contribute to Potential Water Supply Sources Associated with Project Alternatives

Name	Segment	Aquatic Life	Recreation	Fish Consumption	Drinking Water	Comment
Charters Brook -01	Upstream of Shenipsit Reservoir	Full	Not	Full*	Not Assessed	*E. Coli* – source unknown
East Branch Farmington River – 01	Downstream of Lake McDonough	Not	Not	Full*	Full	Flow regime alterations from upstream impoundments/water diversions
Fenton River -01a	Upstream of Mansfield Hollow Lake	Full	Not Assessed	Full*	Not Assessed	-
Fenton River-01b	Upstream of Gurleyville Road	Not	Not Assessed	Full*	Not Assessed	Flow alteration from water diversion, baseflow depletion from groundwater withdrawals
Hockanum River -08	Downstream of Shenipsit Reservoir	Not	Full	Full*	N/A	Unknown – Upstream impoundment impacts from flow regulation suspected
Natchaug River-01	Upstream of Shetucket River	Not Assessed	Not	Full*	N/A	*E. Coli* – source unknown
Nepaug River – 01	Downstream from Nepaug Reservoir	Not	Not	Full*	N/A	Flow regime alterations from upstream impoundments/water diversion
Shenipsit Reservoir	Tolland	Full	Not Assessed	Full	Full	-

Full = no impairment for designated use.
Full* = Fish consumption advisory
Not = Does not meet standard of designated use.

TABLE 4.11-3
Connecticut DPH Source Water Assessment Report Summary

Name	Environmental Sensitivity	Potential Risk Factors	Source Protection Needs	Overall Susceptibility Rating
CWC – Shenipsit Reservoir	Low	Low	High	Moderate
MDC – Barkhamsted Reservoir	Low	Low	Low	Low
MDC – Nepaug Reservoir	Low	Low	Low	Low
WWW – Willimantic Reservoir	Moderate	High	High	High

4.11.2 GROUNDWATER RESOURCES

The CT DEEP maintains water quality classifications for groundwaters in the state. These classifications have been applied based on criteria presented in the 2011 *Water Quality Standards*. Groundwater quality in the vicinity of the study area ranges from Class GB to Class GAA as noted in the sections below. Designated uses of groundwater for the defined water quality classifications include:

- Class GAA groundwaters are designated for existing or proposed public drinking water supplies without treatment, groundwater in the area that contributes to a public drinking water supply well, and groundwater in areas that have been designated as a future water supply area. A designation of "well impaired" or "impaired" is applied in areas where contamination is known to have occurred.

- Class GA groundwaters are designated for existing private water supply wells or an area with the potential to provide water to public or private water supply wells. It is presumed that groundwater in such areas is, at a minimum, suitable for drinking or other domestic uses without treatment. A designation of "impaired" is applied in areas where contamination is known to have occurred.

- Class GB denotes groundwaters within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals, or land use impacts.

Table 4.11-4 lists areas that are of particular note for having poor or potentially poor groundwater quality. The remaining areas within the potential project boundary have water quality that is listed as either GA or GAA quality. Additional details regarding these areas are presented in Section 4.15 as well as under the evaluation for each alternative.

Although not documented in the water quality classification[5], hydrocarbon contamination has been documented in the Mansfield Four Corners area since at least 1981. As described in the 2002 Mansfield *Water Supply Plan*, seven properties in the vicinity of the intersection of Route 195 and Route 44 have been subject to investigation and/or remediation under the DEEP's Leaking Underground Storage Tank (LUST) program. The LUST files describe incidents of gasoline tank leakage and solvent spills in the area. Groundwater monitoring indicated concentrations of Methyl-Tert Butyl Ether, benzene, toluene, and other hydrocarbons in several wells. As contamination of drinking water supplies in this area has been handled on a case-by-case basis, with the CT DEEP and DPH requiring either carbon filtration or the provision of bottled water to the site, the 2002 Mansfield WSP suggested provision of public water supply to this area to address the contamination issues.

[5] The hub of the historical village of Mansfield Four Corners is technically the intersection of Moulton Road and Daleville Road with Route 44. This is located approximately 2,500 feet east of the intersection of Route 195 and Route 44. A designation of GAA-Impaired is listed in this area resulting from an inactive petroleum leak. Given the information above, it is possible that this area was incorrectly mapped as having impairment in place of the intersection of Route 195 and Route 44.

TABLE 4.11-4
Areas with Reduced Groundwater Quality

Name	Pipeline Segments	Water Quality
East Hartford	1	GB
Manchester	2, 7	GB
Charter Oak Wellfield	2	GAA – Well Impaired
Depot Campus	6	GA - Impaired
Tolland Turnpike, Manchester	7	GA - Impaired
Talcottville	7	GB; GAA – Well Impaired
Exit 64-65 off Interstate 84	7	GA - Impaired
Vernon	7	GA - Impaired
Mansfield Center	25, 26, 27, 28, 29, 30, 31	GAA - Impaired
Lions Park	33	GAA - Impaired
South of Spring Hill	40	GAA - Impaired
Former UConn WPCF	54	GB
River Park	56	GB
Spring Manor Farm	63	GA - Impaired

The 2002 Mansfield *Water Supply Plan* identified the Spring Hill area of Mansfield as having high levels of nitrate in the groundwater. In addition, at least one property was subject to contamination from a leaking heating oil tank (coincident with information along pipeline segment 40 in Table 4.11-4). While nitrate levels were decreasing at the time of the 2002 WSP, this area may still be a concern.

Finally, the Connecticut DPH completed Source Water Assessment reports evaluating all public water supply sources in Connecticut in 2003. Each report rated the overall susceptibility of the public water system source to pollution. The only existing groundwater source applicable to this evaluation was the Fenton River Wellfield which had an environmental sensitivity of "low," a potential risk factor rating of "low," and "low" source protection needs for an overall susceptibility rating of "low." Note that the susceptibility of a source to pollution does not necessarily imply poor water quality.

4.11.3 STORMWATER MANAGEMENT

Stormwater runoff is comprised of excess precipitation that flows over the ground surface and impervious areas to storm drains or watercourses. Its quality will reflect the land uses and surfaces it contacts. The *Conservation and Development Policies Plan for Connecticut* recognizes the expanding significance of nonpoint pollution sources in water quality concerns. In rebuilding or expanding urban infrastructure, the plan recommends incorporating appropriate stormwater management technologies to minimize adverse impacts of runoff on surface or groundwaters. For new development, the plan promotes design and engineering approaches to stormwater handling that minimize impervious cover and incorporate nonstructural design features and management techniques to renovate runoff.

The CT DEEP has prepared several documents related to reducing construction impact to nearby wetlands, watercourses, and water bodies. The 2002 *Guidelines for Soil Erosion and Sediment*

Control can be used as either a primary guiding document or to set the minimum requirements for best management practices during construction activities. The primary focus of the guidelines is to prevent and control water-based erosion and associated sedimentation. The 2004 *Connecticut Stormwater Quality Manual* provides guidance on the measures necessary to protect these resources during new development, redevelopment, and upgrades to existing development. These measures include site planning, source control and pollution prevention, and stormwater treatment practices. Any development alternative would be a state project and therefore would need to comply with the guidelines in these plans. In addition, new large developments are typically required to prepare and maintain a Stormwater Pollution Prevention Plan.

States are required to develop Total Maximum Daily Load (TMDL) analyses for waters impaired by pollutants for which technology-based controls are insufficient to achieve water quality standards. For example, most streams in Connecticut that receive treated wastewater from a WPCF have had a TMDL analysis performed for this source. Therefore, the TMDL represents the maximum loading that a waterbody can receive without exceeding its established water quality criteria.

According to Nonpoint Education for Municipal Officials (NEMO), impervious cover has long been recognized as a useful indicator of the impact of the watershed land use on the health of the receiving water body by integrating a variety of impacts resulting from urbanization. The CT DEEP has identified a TMDL for Eagleville Brook based on impervious cover. This parameter was used because Eagleville Brook was found to be impaired due to a complex array of pollutants transported by stormwater; therefore, a TMDL could not be tied to any one particular pollutant or source. Improved stormwater management has been the primary method of mitigation in this watershed, which includes a portion of the proposed Technology Park on North Campus.

4.12 FLOOD HAZARD POTENTIAL

Connecticut regulations for Floodplain Management for state agencies were established in April 1987. These regulations require that a state agency certify that the activity is consistent with all applicable standards. This process is completed through a Flood Management Certification process administered by CT DEEP. Section 25-68h-2 of the Regulations of Connecticut State Agencies (RCSA) outlines the floodplain management standards. In general, these regulations require that new construction be performed to be free from flooding; that new buildings are elevated above the base flood elevation; that no fill be placed in the floodplain that would raise the base flood elevation by one foot; and that on-site stormwater management shall be prepared to minimize any adverse increases to the peak flow rate, the timing of runoff, and the volume of runoff.

In addition, the CT DEEP and the Connecticut DPH administer other guidelines and regulations related to flood hazard potential. These are discussed in the following sections.

4.12.1 FEMA SPECIAL FLOOD HAZARD AREAS

The most recent mapping depicting Special Flood Hazard Areas (SFHAs) in East Hartford, South Windsor, and Manchester as defined by the Federal Emergency Management Agency (FEMA) was completed in September 2008. Digital mapping was prepared concurrently with the release of a consolidated Flood Insurance Study (FIS) for all municipalities in Hartford County under the

Map Modernization program. The consolidated FIS for Tolland County has not yet been completed. Therefore, the evaluation of SFHAs in these communities is based on each existing municipal FIS completed for Bolton (1981), Coventry (1982), Mansfield (1981), Tolland (1982), and Vernon (1999). Table 4.12-1 identifies potential pipeline routes located within the 1% annual chance floodplain.

State policy promotes long-term nonintensive uses for projects within flood hazard areas, with utilities located to discourage floodplain development. State policy regarding floodplain development is articulated in Section 25-68(b)(4) of the CGS, requiring that a proposed action promote long-term nonintensive floodplain uses and have its utilities located to discourage floodplain development. This policy invokes a higher standard than the engineering standards contained in either the federal or the municipal floodplain regulations.

TABLE 4.12-1
Areas Within the 1% Annual Chance Floodplain

Pipeline Segment(s) (Wellfield)	Area
1	Silver Lane near Brentmoor Road
2	Crossings of Folly Brook (floodway), Globe Hollow Brook (floodway), Birch Mountain Brook (floodway), Ash Brook, Skungamaug River, and Willimantic River
3 (MD-1), 4	Willimantic River floodplain (floodway for well location)
6	Crossing of Nelson Brook
7	Southwest corner of former Laurel Lake, two crossings of the Hockanum River (one floodway), crossings of Gages Brook and Chapin Meadow Brook
12, 12B	Willimantic River floodplain
13	Crossing of Nelson Brook
14	Crossings of Nelson Brook and Cedar Swamp Brook
15	Crossing of Nelson Brook
18	Crossing of Cedar Swamp Brook
23, 24 (MH-6), 25	Mansfield Hollow Reservoir
31	Lower Fenton River / Mansfield Hollow Reservoir
32	Mansfield Hollow Reservoir
33	Unnamed tributary to the Fenton River
35, 36	Crossing of Fenton River and floodplain
36	Crossing of Fenton River and floodplain
42 (EP-4)	Willimantic River floodplain / floodway
51, 52	Crossings of Eagleville Brook
54	Eagleville Brook
55	Crossing of Cedar Swamp Brook, Willimantic River floodplain
56 (MD-3)	Willimantic River floodplain
63	Willimantic River floodplain

In order to certify a state-funded project, it must be determined to be a nonintensive use of the floodplain. The determination of whether a specific proposal is considered nonintensive requires examination of numerous factors, including the existing state of the floodplain and its natural resources, the types of uses proposed for the floodplain area, the design of the entire proposal and

the extent of encroachment into the floodplain, and the availability of alternatives to siting within the floodplain. In order to ensure compliance with state policy, any proposed development must not result in more intensive uses of the floodplain than presently exist.

Intensive floodplain uses have been interpreted by DEEP to include:

- New residential uses within the floodplain
- Any increase in the square footage of office, retail, industrial, or business uses
- Conversion of nonresidential use(s) to residential use

The installation of underground utilities is generally considered to be a nonintensive activity provided that additional development will not be spurred within the floodplain. The creation of new pump houses or treatment buildings would not be considered intensive since such structures would be elevated above the base flood elevation through mounding. Fill in the floodplain that raised the water surface elevation by one foot or more would need to be offset by floodplain mitigation. In addition, uses that are classified as intensive would preclude use of state funding unless an exemption was granted.

4.12.2 STREAM CHANNEL ENCROACHMENT LINES

The State of Connecticut Stream Channel Encroachment Line (SCEL) program was instituted in the 1950s prior to the creation of the National Flood Insurance Program (NFIP) that delineated the floodplains discussed in the previous section. The SCEL program regulates the placement of encroachments and obstructions riverward of defined boundary lines in order to lessen the hazards to life and property due to flooding through a CT DEEP permitting process. The regulatory lines associated with this process do not necessarily coincide with either the 1% annual chance or the 0.2% annual chance floodplains mapped by FEMA.

Stream channel encroachment lines intersect the following pipeline routes:

- Hockanum River in Manchester and Vernon (pipeline segment 7, three locations)
- Willimantic River in Coventry and Mansfield [pipeline segments 2, 3 (MD-1), 4, 12A, 12B, and 42 (EP-4)]. It is also close to pipeline segment 63 such that closer review during the design phase would be warranted if necessary.

Projects that incorporate these pipeline routes or areas may be subject to the SCEL permitting process.

4.12.3 ANNUAL HIGH WATER MARK

The Connecticut DPH utilizes the annual high water mark (100% annual chance flood) as well as the 1% annual chance flood elevation to determine well site suitability. This information typically needs to be determined on a site-specific basis. An analysis of the high water mark is presented under each alternative involving the creation of a new well under potential pollution sources.

4.13 PHYSICAL ENVIRONMENT

4.13.1 TOPOGRAPHY

The topography in the study area is extremely variable. In most cases, the topography of the area is reflective of the underlying bedrock and ranges from very flat to very steep. Changes in topography presents challenges for maintaining water main pressure and flow as well as potentially causing construction issues. As such, the change in topography is evaluated under each alternative.

4.13.2 SURFICIAL GEOLOGY

Potential source areas and pipeline routes contain a variety of soil types and surficial geology. The type of soil in a particular area presents construction challenges related to trenching, bedding, and drainage in the vicinity of a new pipeline. In addition, soil types classified as poorly drained, very poorly drainage, alluvial, and floodplain are considered to be wetlands.

Surficial materials in the study area are mapped on the 2005 *Quaternary Geologic Map of Connecticut*. These include areas of glacial till, stratified drift, and swamp land. Of particular interest to this analysis are areas mapped as stratified drift. Property owners occasionally install private wells within areas of stratified drift, and many public water systems install large supply wells into such materials. As such, areas of stratified drift are particularly important when considering the placement of new wellfields. Therefore, the types of surficial geology within the study area and the potential impact to private wells are evaluated under each alternative.

4.13.3 BEDROCK GEOLOGY

According to the 1985 Bedrock Geologic Map of Connecticut, potential source sites and pipeline routes are underlain by several bedrock formations consisting primarily of arkose, dioritic gneiss, dolerite, gneiss, granitic gneiss, granofels, quartz veins, quartzite, and schist. Areas where bedrock is close to the surface ("ledge") are of particular interest to this analysis since such areas can inhibit the installation of water mains. The presence of ledge is particularly prevalent in the Bolton Notch area as well as along Interstate 84.

Several fault lines intersect potential pipeline routes. These faults are generally inactive and, if active, have only minimal activity. The faults include the following:

- The Eastern Border Fault (and associated faults) in Manchester and Vernon (pipeline segments 2 and 7). This is a high-angle fault that is mostly Jurassic in origin and is believed to be inactive. It lies generally north-south throughout east-central Connecticut and stretches from New Haven to Keene, New Hampshire. This fault marks the eastern boundary of the Connecticut River Valley with the eastern highlands of Connecticut.
- A fault line in Bolton and Tolland (pipeline segments 2 and 9) that is considered questionable as to whether it is a fault or a contact. This fault runs generally northeast from East Hampton to Tolland.
- A fault line is mapped in Tolland (pipeline segment 11). This fault line runs generally northeast from Coventry to Union.

- A thrust fault that is mostly Devonian or Ordovician in origin runs northeast through Coventry, Mansfield, Willington, and Union. This fault line runs nearly parallel to Route 44 near the University and intersects pipeline segments 14 and 15. Associated undefined faults pass through pipeline segments 19 and 21; and 36, 37, 49, and 54 in the vicinity of Storrs.
- The Willimantic Window is an inlier through the upper plate of a thrust fault. This closed-loop fault is centered on southern Mansfield and intersects pipeline segments 23, 31, 35, 39, and 40.

4.14 AIR QUALITY AND NOISE

4.14.1 FEDERAL AIR QUALITY REGULATIONS AND CRITERIA

The Federal Clean Air Act was passed by Congress in 1970 and signed into law by former President Nixon. It was last amended in 1990. This act requires the EPA to ensure that all Americans have safe air to breathe by (1) reviewing the public health standards for six major air pollutants every five years; (2) updating the standards as necessary to "protect the public health with an adequate margin of safety" based on the most recent studies available; and (3) consider only the public health, not the cost of compliance, when setting air quality standards.

In an effort to achieve the Clean Air Act goals, the EPA promulgated primary and secondary national ambient air quality standards (NAAQS) in 1971 for six pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), and particulate matter smaller than 10 micrometers in diameter (PM_{10}). Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The NAAQS pollutants and standards as updated through June 2010 are presented in Table 4.14-1.

TABLE 4.14-1
National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards
	Level	Averaging Time	
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None
	35 ppm (40 mg/m^3)	1-hour[1]	
Lead	0.15 µg/m^3 [2]	Rolling 3-Month Average	Same as Primary
	1.5 µg/m^3	Quarterly Average	
Nitrogen Dioxide	53 ppb [3]	Annual (Arithmetic Mean)	Same as Primary
	100 ppb	1-hour[4]	None
Particulate	150 µg/m^3	24-hour [5]	Same as Primary
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[6] (Arithmetic Mean)	Same as Primary
	35 ug/m^3	24-hour[7]	
Ozone	0.075 ppm (2008 standard)	8-hour[8]	Same as Primary
	0.08 ppm (1997 standard)	8-hour[9]	
	0.12 ppm	1-hour[10]	
Sulfur Oxides	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm over 3-hours [1]
	0.14 ppm	24-hour[1]	
	0.075 ppm [11]	1-hour	None

Notes: ppb = parts per billion; ppm = parts per million

[1] Not to be exceeded more than once per year.

[2] Final rule signed October 15, 2008.

[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

[5] Not to be exceeded more than once per year on average over three years.

[6] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. (b) The 1997 standard – and the implementation rule for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. (c) EPA is in the process of reconsidering these standards (set in March 2008).

[10](a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

[11]Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Source: DEEP Bureau of Air Management NAAQS (2010)

4.14.2 STATEWIDE AIR QUALITY POLICIES AND REGULATIONS

Connecticut has adopted the national standards above and a State Implementation Plan to attain and maintain these standards. The entire state is currently in attainment for CO, NO_2, Pb, SO_2, and PM_{10}. According to the U.S. EPA's Environmental Justice viewer, the entire state of Connecticut is designated as a nonattainment area for the 8-hour Ozone standard set in 1997, and Hartford and Tolland counties are shown as meeting the annual (1997) standard and 24-hour (2006) standard for particulate matter ($PM_{2.5}$).

The *Conservation and Development Policies Plan* for Connecticut recognizes that the state has seen major improvements in air quality over the past 20 years. However, additional effects of air pollution are being identified, and new concerns are emerging that will require greater control efforts. Balancing air quality gains with the costs of such controls and the ability to provide for economic development is a critical planning concern. A list of the policies and strategies for air quality from the plan follows.

- Seek to attain NAAQS by the applicable deadlines with emphasis on cost-effective strategies and effective enforcement.
- Develop strategies to achieve and maintain healthy air quality that will enable and foster economic development within the urban areas of the state as designated within this plan.
- Foster transportation and development plans and projects that promote attainment and maintenance of healthy air.
- Establish and maintain standards that will protect citizens from the dangers of hazardous air pollutants and integrate monitoring and regulation of such pollutants into air quality enforcement activities.
- In order to reduce the risk of global climate change, seek to reduce statewide carbon dioxide emissions to 1990 levels by 2010 and to reduce further where technically and economically feasible. Also seek to reduce emissions of other substances that contribute to global warming.

4.14.3 NOISE

Section 22a-69 of the CGS gives the Commissioner of Environmental Protection the authority to develop, adopt, maintain, and enforce a comprehensive statewide program of noise regulation, including:

- Controls on environmental noise through the regulation and restriction of the use and operation of any stationary noise source
- Ambient noise standards for stationary noise sources that, in the commissioner's judgment, are major sources of noise when measured from beyond the property line of such source

- Consultation with state and local governmental agencies when such agencies adopt and enforce codes, standards, and regulations dealing with noise insulation and abatement for any occupancy or class of occupancy

- Controls on airport and aircraft noise to the extent not preempted by federal law

Sections 22a-69-1 to 22a-69-7.4 of the RCSA set forth the statewide program of noise regulation. Class A noise zones include residential areas where human beings sleep or areas where serenity and tranquility are essential to the intended use of the land. The Class B Land Use category includes retail trade, personal business and legal services, educational institutions, government services, agricultural activities, and lands intended for such commercial or institutional uses. It also includes transportation, communications, and utilities. Class C lands include manufacturing activities, transportation facilities, warehousing, military bases, mining, and other lands associated with production uses. As such, potential pipeline routes are located within and adjacent to areas of Class A, Class B, and Class C noise zones.

The regulations require the following:

- No person shall cause or allow the emission of impulse noise in excess of 80 decibels during the night in a Class A noise zone, nor in excess of 100 decibels at any time regardless of zone.
- Continuous noise within five decibels below the standards set for each noise zone (Table 4.14-2) shall be considered excessive.

The regulations indicate that no person in a Class B noise zone shall emit noise exceeding the levels stated in Table 4.14-2. Levels emitted in excess of values listed below are considered to be excessive noise.

TABLE 4.14-2
Noise Zone Standards for Emitter to Designated Receptor (dBA)

Noise Zone	C	B	A (Day)	A (Night)
A	62	55	55	45
B	62	62	55	45
C	70	66	61	51

Note: dBA = A-Weighted Decibels

While no site-specific noise monitoring data was collected for the proposed project, site observations and existing land uses are coincident with noise levels well below the levels indicated in Table 4.14-2.

4.15 SOLID WASTE, HAZARDOUS MATERIALS, AND POTENTIAL POLLUTION SOURCES

Solid waste, hazardous materials, and potential pollution sources exist throughout and in the vicinity of the potential pipeline routes. For the subject analysis, these potential pollution sources are pertinent when: (1) they are proximal to a proposed wellfield and could therefore impact the raw water quality of the new source; or (2) when they are occurring in an area that is serviced by

private water supplies or a public water supply that requires extensive treatment or is having difficultly complying with water quality regulations. In the latter case, extension of a public water supply main from a water system to improve water quality is suitable to improve public health. This has occurred in many areas of Connecticut.

4.15.1 SOLID WASTE

According to the *Conservation and Development Policies Plan* for Connecticut, the state has put into place most of the components of a new system for the management of municipal solid waste. For example, the State of Connecticut passed a mandatory recycling law in 1987 that prohibits glass bottles, cans, and newspapers from being disposed at landfills or at resource recovery facilities. This legislation was specifically designed to reduce Connecticut's solid waste stream by 25%.

This system has largely replaced past reliance on landfills with a new emphasis on reducing the amount of waste generated and on capturing reusable materials and energy before disposal. Waste avoidance and minimization, recycling, composting, resource recovery, and properly sited and regulated landfills constitute an integrated system for solid waste management in Connecticut. The statewide policy on solid waste is to continue the timely planning, financing, construction, and operation of a statewide integrated recycling, composting, resource recovery, and landfill system.

4.15.2 HAZARDOUS MATERIALS

The United States Department of Transportation defines hazardous materials as "*any substance which may pose an unreasonable risk to health and safety of operating or emergency personnel, the public, and/or the environment if not properly controlled during handling, storage, manufacture, processing, packaging, use, disposal, or transportation*." The University currently utilizes a wide variety of hazardous materials in its academic, research, and other operations such as at the motor pool. The usage of such materials is overseen by the University's Division of Environmental Health and Safety (EH&S). EH&S ensures that all written policies, procedures, and training materials for applicable regulatory standards are established, current, and delivered to appropriate campus groups, and maintains a current departmental web page to enhance access to health and safety policies, procedures, technical guidance documents, and compliance assistance information.

Water utilities typically utilize chemicals that in their undiluted form are considered to be hazardous materials. For example, potassium hydroxide is typically utilized to increase pH for corrosion control in water systems that utilize groundwater sources. While dangerous in large amounts, this hazardous material is nontoxic to humans in the dosages utilized to treat public water supply.

The use of hazardous and even nonhazardous materials can result in the generation of hazardous wastes that require proper disposal. Hazardous wastes are defined by the United States EPA as having corrosive, reactive, ignitable, or toxic characteristics that can potentially harm human health or the environment when improperly managed. Hazardous waste generation, treatment, storage, and disposal are regulated by the federal Resource Conservation and Recovery Act (RCRA).

According to the *Conservation and Development Policies Plan* for Connecticut, common waste streams among the state's hazardous waste generators include heavy metal-bearing sludges, used solvents, and inorganic liquids such as spent acids and caustic solutions. Connecticut generators rely on out-of-state access to disposal capacity because increased federal regulatory requirements imposed in the mid 1980s effectively ended in-state disposal practices. Previously, industrial wastes were often directly discharged to surface impoundments adjacent to manufacturing plants or disposed in municipal landfills that accepted such wastes. This was the case for the University, which formerly operated a landfill and chemical pits west of LeDoyt Road. The use and eventual closure of these facilities led in part to the extension of the University's public water supply system to serve non-University residences in Mansfield during the 1980s.

The United States EPA maintains a database of potential pollutant sources and/or generators of hazardous wastes. The University is classified as a large-quantity generator of hazardous waste. The University's Main Accumulation Area (MAA) is used for the temporary (less than 90-day) storage of chemical (RCRA hazardous waste), low-level radioactive, and biological/medical waste generated by the University's academic, research, and teaching laboratories as well as a smaller amount of waste from other operation such as the University's motor pool. The chemical waste is securely stored in the MAA facility for not more than 90 days before being removed from campus by an EPA-licensed transporter. Biological waste is removed on a weekly schedule. Radioactive waste is limited to one shipment every 12 to 15 months and consists of minimal amounts of low-level waste and laboratory debris such as gloves and paper towels. Additional hazardous wastes generated by the University in the future will be managed in this manner. Hazardous wastes generated at facilities not owned by the University are and will be the responsibility of the generators of such wastes.

4.15.3 OTHER POTENTIAL POLLUTION SOURCES

The location of other potential pollutant sources has been evaluated through the following databases:

- Connecticut Leachate and Wastewater Discharge Sites (LWDS) database
- Connecticut LUST list
- Connecticut Oil and Chemical Spills (SPILLS) database
- Facility Index System
- Facility Manifest Data
- Property Transfer Filings
- Registered Underground Storage Tanks (UST)
- Site Discovery and Assessment Database (SDADB)
- Solid Waste Facilities and Landfill Sites

In some cases, this information is available geospatially through the CT DEEP. In many cases, known sources of pollution spatially coincide with areas of poorer surface or groundwater quality. The remaining databases were accessed via Environmental Data Resources of Milford, Connecticut for locations proximal to new wellfields.

The Connecticut DPH has the following requirements for the siting of new wells to protect them from potential pollution sources:

- Well must be located on a relatively high point on the premises and be protected against surface wash.
- Well must be as far removed from any known or probable source of pollution as possible (at least 200 feet).
- Well must be at least 50 feet from any drain carrying surface water or a foundation drain and be in a direction away from groundwater flow from any existing or probable source of pollution.
- Well must be located at least 200 feet from any dry well and from any liquid fuel storage tank and piping. Liquid fuel storage and piping is allowed if its sole purpose is to provide a backup source of energy to the wellfield provided that mitigation measures are utilized to protect against spills.
- Well must be located greater than 50 feet from the high water mark (100% chance annual flood level) of any surface water body and above the elevation of the 1% annual chance flood.
- Wells within 200 feet of a surface water body (not wetland) will require a Groundwater Under the Direct Influence (GWUDI) of surface water study.
- The public water system must have full control of the sanitary radius (200 feet) around the wellhead either through ownership or sanitary easement.

Each potential well site is evaluated against these requirements under the applicable alternatives.