7.0 ALTERNATIVE #3 – INTERCONNECTION WITH THE CONNECTICUT WATER COMPANY

7.1 FEASIBILITY ASSESSMENT

This alternative involves a water supply interconnection with The Connecticut Water Company (CWC). CWC owns and operates a large private water utility in northern Connecticut that has many supply sources. CWC currently has sufficient available water to meet its projected demands without the extension of a pipeline to the University and Mansfield.

CWC calculated the additional water supply likely to be utilized through an interconnection to the University and the Town of Mansfield in its 2011 *Water Supply Plan* addendum. While these plan amendments are helpful to show how bringing new increments of supply online will increase margins of safety (MOS), thus allowing CWC to provide water to the University and Mansfield, the scope of the subject Environmental Impact Evaluation (EIE) necessitates analyzing CWC's projections from a different perspective. Specifically, it is important to understand how much excess water is available from the Western System if supply is increased while the Western System experiences an internal annual growth of 0.25%. These excess water figures must then be compared to the average day transfer of water of 1.23 million gallons per day (mgd), potential peak day transfer of water of 1.93 mgd, and the ability to expand to accommodate future additional on-campus growth.

To evaluate the CWC supply, two sets of water demand projections were developed as follows:

1. Method #1: Projections from "base" demand figures of average day demand (ADD), maximum month average day demand (MMADD), and peak day demand (PDD) that are equal to the averages of the ADD, MMADD, and PDD from 2007 through 2011; and peaking factors equal to the averages of the peaking factors from 2007 through 2011. *These projections are similar to CWC's tables in the October 3, 2011 water supply plan amendments.*

2. Method #2: Projections from base demand figures of ADD, MMADD, and PDD that are assumed equal to actual recorded water demands from calendar year 2011; and peaking factors from 2011.

If sufficient water is found to be available through both sets of projections, then a high degree of confidence will result. Table 7.1-1 provides the water demand projections. In all cases, the planning years of 2015, 2020, 2030, and 2060 were selected to match the years used by CWC in the water supply plan amendments.

TABLE 7.1-1
Projected Western System Water Demands (mgd)

Year	Method #1 (5-Year Average)			Method #2 (2011 Base Year)		
	ADD	MMADD	PDD	ADD	MMADD	PDD
Base "Year"	*9.27*	*11.56*	*14.47*	*8.94*	*11.68*	*15.17*
2015	9.36	11.67	14.59	9.03	11.80	15.32
2020	9.48	11.81	14.77	9.14	11.95	15.51
2030	9.72	12.11	15.15	9.37	12.25	15.91
2060	10.48	13.05	16.33	10.10	13.20	17.14

As of August 2012, the Western System had already experienced peak day and maximum month water demands. This is typical for most water utilities. The PDD in 2012 was 14.88 mgd, and the MMADD was 12.11 mgd. The year-to-date ADD was 9.36 mgd. These figures are generally consistent with the Method #1 and #2 base years.

Current available water was tabulated in the October 3, 2011 amendment to the CWC water supply plan as follows: 14.04 mgd for the ADD and the MMADD, and 16.69 mgd for the PDD. The available water from the Rockville Water Treatment Plant (WTP) is assumed to be 6.0 mgd for all three cases, lower than the safe yield of Shenipsit Reservoir and equal to plant capacity.

To determine whether any excess water is available, water figures were compared to the above projections plus a 15% MOS. For the year 2015, the projected PDD plus 15% is higher than the available water of 16.69 mgd for each of the methods. Therefore, without reconfigured sources of supply to increase its available water, CWC cannot secure permission from the Connecticut Department of Public Health (DPH) to obligate 1.93 mgd or more to the University and Mansfield. Four reconfigured supplies are described below in sequence.

Powder Hollow Wellfield – An initial increment of additional supply for the Western System would come from the recovery of registered capacity from the Powder Hollow Wellfield located in the town of Enfield. The active wells are numbered 1, 2, and 4. The total registration for Wells 1, 2, and 4 is 2.78 mgd. However, the current available water reportedly ranges from 1.88 mgd (ADD and MMADD) to 2.5 mgd (PDD).

CWC has retained a contractor, and work has begun to install and test a replacement well at the Powder Hollow Wellfield. Assuming that capacity can be increased to the registration value, the available water for meeting PDD will increase by 0.28 mgd. The available water for meeting ADD and MMADD may increase by a higher amount of 0.8 mgd (from 1.88 mgd to 2.68 mgd, which is the wellfield safe yield). The water available to the Western System will then be as follows:

- ADD: 14.04 mgd + 0.8 mgd from Powder Hollow = 14.84 mgd
- MMADD: 14.04 mgd + 0.8 mgd from Powder Hollow = 14.84 mgd
- PDD: 16.69 mgd + 0.28 mgd from Powder Hollow = 16.97 mgd

Preston Wellfield – A second increment of additional supply for the Western System is from an existing source of supply. The Preston Well, located in Somers, was removed from active daily supply several years ago. Since that time, CWC's regional pipeline from Enfield has been

augmenting supplies in Somers. CWC has asserted that the Preston Wellfield will be returned to active use as needed to meet system demands. DPH would need to approve the start-up upon receipt of appropriate water quality data. This is true for all wells in Connecticut that have been placed on emergency-use status. The available water from this source is reported by CWC to range from 0.17 mgd (ADD and MMADD) to 0.23 mgd (PDD). The water available to the Western System would then be as follows:

- ADD: 14.04 mgd + 0.8 mgd from Powder Hollow + 0.17 mgd from Preston Wells = 15.01 mgd
- MMADD: 14.04 mgd + 0.8 mgd from Powder Hollow + 0.17 mgd from Preston Wells = 15.01 mgd
- PDD: 16.69 mgd + 0.28 mgd from Powder Hollow + 0.23 mgd from Preston Wells = 17.20 mgd

Refer to Table 7.1-2 for MOS calculations utilizing the additional increments of available supply discussed above. Using Method #1 (CWC's projections), CWC will have 0.42 mgd excess water under PDD conditions in 2015 and 0.21 mgd excess under PDD conditions in 2020 with the addition of water from the Powder Hollow and Preston Wells, with even greater quantities under ADD and MMADD conditions.

TABLE 7.1-2
Projected Western System Excess Available Water (mgd) with Additional Capacity from Powder Hollow and Preston Wells

Year	Method #1 – 5-Year Average			Method #2 – 2011 Base Year		
	ADD	MMADD	PDD	ADD	MMADD	PDD
2015	4.24	1.59	0.42	4.63	1.44	None
2020	4.11	1.43	0.21	4.50	1.27	None
2030	3.83	1.08	None	4.23	0.93	None
2060	2.96	None	None	3.39	None	None

Note: Yellow shading indicates insufficient water to meet demands at the University and in Mansfield.

However, when considering Method #2, sufficient excess water is not demonstrated; therefore, additional supply would be needed to meet a 1.93 mgd commitment to the University and Mansfield.

Hunt Wellfield – A third increment of additional supply for the Western System would come from the recovery of registered capacity from the Hunt Wellfield located in the town of East Windsor. The active wells are numbered 5, 6, 7, 8, 9, and 10. The total registration for Wells 5 through 10 is 4.18 mgd. However, the current available water is reported by CWC to range from 2.12 mgd (ADD and MMADD) to 2.82 mgd (PDD). Assuming that capacity can be increased to the registration, the available water for meeting PDD would increase by 1.36 mgd. The available water for meeting ADD and MMADD may increase by a higher amount of 1.48 mgd (from 2.12 mgd to 3.60 mgd; 3.60 mgd is believed to be the total safe yield as adjusted for individual diversion limits). The water available to the Western System would then be as follows:

- ADD: 14.04 mgd + 0.8 mgd from Powder Hollow + 0.17 mgd from Preston Wells + 1.48 mgd from Hunt = 16.49 mgd
- MMADD: 14.04 mgd + 0.17 mgd from Preston Wells + 0.8 mgd from Powder Hollow + 1.48 mgd from Hunt = 16.49 mgd
- PDD: 16.69 mgd + 0.28 mgd from Powder Hollow + 0.23 mgd from Preston Wells + 1.36 mgd from Hunt = 18.56 mgd

Refer to Table 7.1-3 for MOS calculations utilizing the additional increments of available supply discussed above. Under this scenario and using Method #1, CWC has at least 1.0 mgd excess water under PDD conditions in 2015, 2020, and 2030, with even greater quantities available under ADD and MMADD conditions, with lower projections per Method #2. In either case, additional supply would be needed to meet a PDD of 1.93 mgd to the University and Mansfield.

TABLE 7.1-3
Projected Western System Excess Available Water (mgd) with Additional Capacity from Powder Hollow, Preston, and Hunt Wells

Year	Method #1 – 5-Year Average			Method #2 – 2011 Base Year		
	ADD	MMADD	PDD	ADD	MMADD	PDD
2015	5.72	3.07	1.78	6.11	2.92	0.94
2020	5.59	2.91	1.57	5.98	2.75	0.72
2030	5.31	2.56	1.14	5.71	2.41	0.27
2060	4.44	1.48	None	4.87	1.31	None

Note: Yellow shading indicates insufficient water to meet demands at the University and in Mansfield.

Partial Rockville WTP Expansion – The safe yield of the Shenipsit Reservoir is 9.8 mgd whereas the WTP capacity is 6.0 mgd. Thus, CWC has considered expansion of the plant by constructing a premanufactured filtration plant module on the same site as the existing WTP. A suitable location has been identified within an open area on the site. On-site costs associated with a package filtration plant with a capacity of 3.0 mgd have been estimated at $6.5 million. The capacity of the Rockville WTP would be increased to 9.0 mgd, which would also support existing CWC operations. Available water would then be as follows:

- ADD: 14.04 mgd + 0.8 mgd from Powder Hollow + 0.17 mgd from Preston Wells + 1.48 mgd from Hunt + 3.0 mgd from new WTP = 19.49 mgd
- MMADD: 14.04 mgd + 0.17 mgd from Preston Wells + 0.8 mgd from Powder Hollow + 1.48 mgd from Hunt + 3.0 mgd from new WTP = 19.49 mgd
- PDD: 16.69 mgd + 0.28 mgd from Powder Hollow + 0.23 mgd from Preston Wells + 1.36 mgd from Hunt + 3.0 mgd from new WTP = 21.56 mgd

Refer to Table 7.1-4 for available water utilizing the additional increments of available supply discussed above. Under this scenario and using Method #1, CWC will have 1.93 mgd or greater of excess water under PDD conditions through 2060, with even greater quantities under ADD and MMADD conditions. Using Method #2, CWC will have 1.93 mgd or greater of excess water under PDD conditions through the late 2050s, with 1.84 mgd of excess water under PDD conditions in 2060.

TABLE 7.1-4
Projected Western System Excess Available Water (mgd) with Additional Capacity from Powder Hollow, Preston, and Hunt Wells and a 3.0 mgd Treatment Module Rockville WTP Expansion

Year	Method #1 – 5-Year Average			Method #2 – 2011 Base Year		
	ADD	MMADD	PDD	ADD	MMADD	PDD
2015	8.72	6.07	4.78	9.11	5.92	3.94
2020	8.59	5.91	4.57	8.98	5.75	3.72
2030	8.31	5.56	4.14	8.71	5.41	3.27
2060	7.44	4.48	2.79	7.87	4.31	1.84

Full Rockville WTP Expansion – The safe yield of the Shenipsit Reservoir is 9.8 mgd. Thus, CWC has discussed expansion of the plant within the parameters of 3.0 mgd additional capacity for meeting ADD conditions (with the sum of 9.0 mgd still lower than the safe yield) and 6.0 mgd additional capacity for meeting PDD conditions. These expansions would supersede the additional capacity afforded by the package filtration plant, which could then be retired. The water available to the Western System would increase by 3.0 mgd to 6.0 mgd in accordance with the expansion, and all future MOS (Table 7.1-5) would be above 1.15 with more than 2.0 mgd available to the University and Mansfield using Methods #1 and #2 through all planning horizons.

TABLE 7.1-5
Projected Western System Excess Available Water (mgd) with Additional Capacity from Powder Hollow, Preston, and Hunt Wells and a Rockville WTP Expansion to 9.0 mgd

Year	Method #1 – 5-Year Average			Method #2 – 2011 Base Year		
	ADD	MMADD	PDD	ADD	MMADD	PDD
2015	8.72	6.07	7.78	9.11	5.92	6.94
2020	8.59	5.91	7.57	8.98	5.75	6.72
2030	8.31	5.56	7.14	8.71	5.41	6.27
2060	7.44	4.48	5.79	7.87	4.31	4.84

As noted in Table 7.1-5, the full Rockville WTP expansion would be able to provide in excess of 2.0 mgd to the University and Mansfield through 2060. On-site costs associated with this plant expansion could be $35 million. These costs have already been incorporated into CWC's planning because the Rockville WTP expansion is considered to be prudent by 2060 even without supply allocated to the University and Mansfield.

CWC has the ability to purchase treated water from MDC at the existing interconnection located at the Windsor/Windsor Locks town line. Active use of the interconnection anytime in the near-term planning horizons (for example 2015, 2020, or 2030) could allow CWC to postpone various improvements, although it is understood that MDC is not currently interested in providing water through this interconnection.

Summary

The following improvement strategies for realizing additional water supply in the Western System are available to CWC:

- Increase groundwater yields at the Hunt and Powder Hollow Wellfields to regain currently unused (but registered) capacity. This work is underway.
- Bring Preston Well 1 back online. This would provide up to approximately 0.23 mgd and is a CWC short-term priority. This work is underway.
- Install a premanufactured treatment module at the Rockville WTP that could treat an additional 3.0 mgd from Shenipsit.
- Expand the Rockville WTP to increase available supply from the Shenipsit Reservoir for ADD and MMADD by 3.0 mgd (to a total of 9.0 mgd) and for PDD by 6.0 mgd (to a total of 12.0 mgd).

The range of potential improvements has the ability to provide more than 2.0 mgd of excess available supply from the Western System. As such, the improvements would allow for the transfer of such an increment of water to the University and Mansfield.

Since the Western System peak day and the University system peak day rarely occur at the same time, the above analysis is conservative. The University does not require consumption of obligated water under most circumstances in the near term; rather, the University needs the sources on standby for MOS purposes.

The subject EIE recognizes that any future scenario that includes withdrawal of additional water from the Hunt, Preston, and Powder Hollow Wellfields for increasing the total supply available to the Western System will not result in the movement of water from these wellfields to the University and Mansfield. Instead, a fraction of water from the Rockville WTP will shift to the University and Mansfield while water from the wellfields will be used in the environs surrounding these wells (East Windsor, Somers, and Enfield, respectively). A lesser supply of water from the Rockville WTP will be pumped to the western part of the Western System.

In summary, CWC has the capability to provide 1.93 mgd or more of treated water to the University and the Town of Mansfield, with the ability to expand to accommodate additional future potential on-campus growth. Given that this alternative is feasible and can meet the stated project purpose and need, an evaluation of potential impact follows.

7.2 LAND USE AND ZONING

An interconnection between CWC and the University and Town of Mansfield has the potential to affect land use in Coventry, Mansfield, and Tolland as a result of secondary growth that could occur as a result of the availability of a public water supply to the area. Potential impacts for these communities are described below. Impacts to land use or zoning are not expected in Vernon as the area adjacent to the potential pipeline route is currently served with public water.

7.2.1 TOWN OF TOLLAND

Approximately two miles of pipeline would traverse Route 195 in the town of Tolland to support an interconnection with CWC (Refer to Figure 3.4-1). A state-designated Rural Community Center lies along Route 195 from the Tolland Green to Anthony Road. This area lies within the Gateway Design District (GDD) zoning near Interstate 84 and Neighborhood Commercial (NC) zoning from the vicinity of Goose Lane to Anthony Road. From Anthony Road to the Coventry town line, Route 195 traverses state-designated Rural Lands with Residential Design District (RDD) and RDD-Natural Resource and Wildlife Protection Area zoning. Minor Preservation areas intersect the road at watercourses. The purposes of these zoning districts are defined in the Zoning Regulations:

- 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 high 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.

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

- Residential Design Districts – The purposes of the regulations in the Residential Design District are the following:

    - 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, semirural character and ecologically important features of the town's remaining undeveloped land
    - Provide the maximum land area for open space, park and recreation purposes, including trails
    - Provide greater protection in the Natural Resource and 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.

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. Therefore, risk for induced development as a result of a future CWC supply to the University and Mansfield is low.

Public water service is not currently available in the RDD and RDD-Natural Resource and Wildlife Protection Area districts located southeast of Anthony Road. As such, these areas may be vulnerable to induced development if a water main were to become available with excess capacity to supply individual properties. However, development potential is limited. Note the following:

- Most of the parcels on the eastern side of Route 195 are relatively small and developed with single-family homes. These are unlikely to be redeveloped.
- The parcel containing Norwegian Woods has additional room for expansion. Expansion of multifamily/moderate-density residential on this parcel is consistent with Tolland's future land use plan in its *Plan of Conservation and Development*. Expansion of this parcel could be constrained by an overlay zone should Tolland wish to create one, or the overlay zone could exclude this parcel if additional expansion of the facility is desired by the Town.
- The large parcel between Norwegian Woods and Dimock Road is preserved as open space and unlikely to be developed.
- While many small parcels with single-family homes exist along the west side of Route 195, these are unlikely to be redeveloped.
- Seven or eight large parcels on the west side of Route 195 have development potential. These parcels are located on the eastern side of Cassidy Hill and support many wetlands, thus developable areas are limited. In addition, the future land use plan denotes this area as "low-density residential." Development of this area is expected to have a minimal impact on demographics in Tolland.

In summary, if public water is made available in this area, additional development could occur; however, this is a small land area, and secondary growth impacts, if they occur, are anticipated to be limited.

Several options for regulating development along potential water supply extensions are generally available to Tolland: (1) allow the underlying zoning to guide development; (2) amend the Zoning and/or Subdivision Regulations to reference the state's Conservation and Development Policies Plan; or (3) develop an overlay zone. One additional option in Tolland appears possible: (4) zoning and/or subdivision regulations could be amended to require that development be only possible using individual wells. Pros and cons are as follows:

1. The first option is believed to fall short of providing strong protections since multifamily residential development and a number of nonresidential uses are allowed in the RDD zoning district.

2. The second option is not favored because it would require references to the State Plan, currently being updated with potentially major changes.

3. An overlay zone could have strong potential for guiding development in Tolland if a water main were available.

4. If the regulations for the RDD zoning districts (RDD and RDD-Natural Resource and Wildlife Protection Area) were amended to allow development only as it would occur using individual private wells, this could create hardships where two public water systems in the town are already present (CWC and Town of Tolland Water Commission). If new

developments, redevelopments, or even simple one-lot subdivisions were proposed in these areas with existing public water service, it is reasonable to anticipate that they could or should be served by the existing nearby public water system. Furthermore, allowing development only as it would occur using individual private wells throughout the RDD district is contrary to some of the stated goals for the district ("to 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").

The third option would provide protections that are consistent with the State Plan. The specific method of preventing intense development is to allow subdivision of land and development of lots that could occur as if the lots were dependent on individual private wells. This restriction would allow redevelopment, development, or subdivision/development of lots similar to that which could occur at the present time if applicants were to rely on wells but would prevent more intense development that could arise from access to a public water system.

Figure 7.2-1 depicts a potential "Regional Pipeline Overlay Zone" (RPOZ). Because the overlay would only be present in RDD and RDD-Natural Resource and Wildlife Protection Area districts, the Zoning Regulations would require amendment in Article V (Residential Design Districts) to add the overlay zone as Section 5-7. Possible language follows:

Section 5-7. Regional Pipeline Overlay Zone

A. Purpose. The purpose of the RPOZ is to discourage intensive development of redevelopment along a section of Interstate 84 and a section of Route 195 if a public water supply pipeline with excess capacity is installed along the roadways.

B. Location Criteria. The RPOZ is located on the north side of Interstate 84 from the Tolland Business Park (TBP) district to the Tolland Village Area (TVA) district and on the south side of Interstate 84 from the Vernon town line to the GDD, extending a width of 1,000 feet on either side of the highway; and is located on either side of Route 195 from Anthony Road to the Coventry town line, extending a width of 1,000 feet on either side of the highway.

C. Other Requirements. The availability of a public water supply pipeline along Interstate 84 or along Route 195 in the overlay zone shall not allow development at a higher density than the use of individual private wells would permit. All subdivision, zoning permit, site plan approval, and special permit requests in the RDD and RDD-Natural Resource and Wildlife Protection Area districts shall be accompanied by an assessment of on-site water supply and assurance that an on-site supply or supplies would support the proposed action based on capacity (ability of wells to provide the needed water), water quality, and sanitary separations required by the Public Health Code. Such assessment shall be carried out by a hydrogeologist approved by the Planning & Zoning Commission. If the proposed action could be supported by on-site water supplies, then connection to the pipeline in Interstate 84 or Route 195 may be permitted at the commission's discretion. If the proposed action could not reasonably be supported by on-site water supplies, the commission shall not approve the application.

The adoption of an overlay zone along Route 195 would not be appropriate unless the University and the Town of Mansfield select a CWC pipeline along Route 195 as the preferred additional water supply or a portion of the preferred additional water supply.

7.2.2 TOWN OF COVENTRY

Route 195 traverses only a very small portion of the town of Coventry, approximately one-half mile (Refer to Figure 3.4-2). The road passes through a state-designated Conservation Area with a small adjacent Preservation Area. The Windham Region Council of Governments (WinCOG) Land Use Plan depicts a combination of Rural Conservation Area and Priority Preservation Area along Route 195 and Jones Crossing Road. These designations are at odds with the provision of public water supply. Ideally, local zoning designations should support the intended density and character of development reflected in the State Plan designations. When local zoning designations are not consistent, a departure in the type and density of development can occur.

Coventry's *Plan of Conservation and Development* presents "Special Planning Areas for Growth and Infill" located along Route 195 (a total of 11 are designated in the town). 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 of Conservation and Development* states that "*on site sewer and water supply needs to be provided"* and asserts that development should *"consider the proximity to Willington's and Mansfield's commercial nodes*."

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. If public water is made available in this area, additional development could occur; however, this is a small land area, and secondary growth impacts, if they occur, are anticipated to be limited.

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 district is considered suitably protective for preventing intense development near the river. As such, future development in this area, with or without a pipeline, is anticipated to be consistent with the State Plan designations.

Parcels located in the area of pipeline segments 11 and 12A (Route 195) and 12B (Jones Crossing Road) are located within the town of Coventry. These are described below:

- The parcels denoted as a Special Planning Area (Neighborhood Commercial) are currently developed with single-family homes. It is possible that with the provision of public water these areas could be redeveloped into some form of business such as a hotel, but that type of business would not contribute significantly to demographics.

- The large parcel with the Storrs Community Church is primarily located in the 1% annual chance floodplain of the Willimantic River such that subdivision of this parcel would not result in significant development or changes in community demographics.

- The large parcel located between Jones Crossing Road and Route 195 is also primarily in the 1% annual chance floodplain such that subdivision of this parcel would not result in significant development. Similarly, the large parcel on the south side of Jones Crossing Road leading to the river currently supports a home and agriculture use. Limited development potential exists there since the majority of the parcel lies within the 1% annual chance floodplain.

- The 60.9-acre parcel west of Jones Crossing Road slopes steeply to the west and northwest up Cassidy Hill. Development of this parcel would be difficult. However, since it is located in a GR-80 zone, a special permit could allow for a variety of residential uses. Thus, the use of Crossing Option B (pipeline segment 12B) would potentially have more influence on demographics as compared to the use of Crossing Option A (pipeline segment 12A). If the Town of Coventry chooses not to implement an overlay zone to restrict the density of development, this parcel could potentially be developed with a higher density residential use by special permit.

If public water is made available in this area, additional development could occur; however, this is a small land area, and secondary growth impacts, if they occur, are anticipated to be limited.

7.2.3 TOWN OF MANSFIELD

The Town of Mansfield is undergoing a comprehensive and detailed revision of its regulations and has proposed an overlay zone to restrict development in areas of public water supply such that local development is consistent with the State Plan. Refer to Section 4.1.3 for details. The proposed overlay zone will restrict development within potential pipeline areas for the purpose of controlling unwanted or unanticipated secondary growth.

7.3 SOCIOECONOMICS

Under this alternative, the University would be in a better position to service its committed and future water supply demands, and the Town of Mansfield would have sufficient water to serve Mansfield Four Corners and other areas. Additional water supply would also be available in Tolland and a limited area of Coventry. This would affect socioeconomics as discussed below.

7.3.1 DEMOGRAPHICS

Town of Tolland

The total population, average household size, and percentage of minority populations in Tolland could increase slightly as a result of implementation of this alternative; however, the potential for secondary development is small, and significant impacts are not anticipated.

Town of Coventry

The average household size and percentage of minority population in Coventry are not expected to change as a result of the implementation of this alternative.

Town of Mansfield

A proposed overlay zone in combination with the Rural Agricultural Residence (RAR-90) zoning present along the potential pipeline route will restrict the development density associated with this alternative. Positive effects to demographics are expected in Mansfield due to the presence of additional water supply. Table 7.3-1 presents potential developable areas along the various

pipeline routing scenarios. Parcels without extensive undeveloped areas, floodplains, commercially zoned areas, and existing land owned by the University, the State of Connecticut, or the Town of Mansfield (including conservation easements) are not included as developable areas for this calculation. Note that these areas represent entire parcel sizes and not the final developable area of a parcel (subject to restrictions from wetlands, steep slopes, open space requirements, etc.).

TABLE 7.3-1
Developable Residential Parcels in Mansfield by Pipeline Segment
Along Potential CWC Interconnection Routes

Pipeline Segment	Number of Parcels	Total Acres
12A	2	9.9
12B	3	38.3
13	3	166.8
14	5	69.2
15	3	49.3
16	0	0.0
17	1	4.1
18	2	28.8
19	3	29.9
20	0	0.0
21	0	0.0

As noted in Table 7.3-1, some pipeline segments pass residentially developable parcels that could affect demographics. Table 7.3-2 compares the developable areas to the potential pipeline scenarios. This level of residential density could be achieved under existing zoning without the regional pipeline. The presence of the public water supply pipeline may or may not make these areas more attractive to development.

TABLE 7.3-2
Potential Developable Areas Along CWC Pipeline Scenarios

Routing Scenario	Number of Parcels	Total Acres	Potential Population*
#3A-1	13	275.8	671
#3A-2	9	230.1	561
#3A-3	10	245.9	597
#3A-4	10	254.8	619
#3A-5	13	284.7	692
#3B-1	14	304.2	741
#3B-2	10	258.5	629
#3B-3	11	274.3	668
#3B-4	11	283.2	690
#3B-5	14	313.1	763

* Assuming subdivision into one-acre lots with an average household size of 2.44

Based on the figures in Table 7.3-2, the total population of Mansfield could increase by between 560 and 760 people under the CWC interconnection alternative. The population figures presented above represent a maximum scenario under existing zoning that does not account for unbuildable lot areas. The existing zoning in these areas also allows multifamily homes that require larger lot sizes as well as group homes. These types of development would reduce the potential population along the pipeline routes. In addition, this population does not account for potential mixed-use housing in Mansfield Four Corners, which would potentially be part of the 0.17 mgd water demand forecast to be realized over the 20-year planning period. This development is not likely to significantly change existing household sizes but would provide additional housing opportunities.

7.3.2 ECONOMY AND EMPLOYMENT

The local and regional labor force would benefit from the construction of Storrs Center, expansion of North Campus, and the eventual redevelopment of the Depot Campus, all of which would benefit from a supply of water under this alternative. This benefit would include both construction jobs as well as jobs created at these facilities.

Under this alternative, Mansfield Four Corners could be redeveloped, providing additional local jobs. The Neighborhood Business Area at the intersection of Route 195 and Route 32 would directly benefit from the availability of water supply for scenarios involving Crossing Option A (Willimantic River crossing at Route 195) as the pipeline would run directly through this area. This area could eventually benefit if Crossing Option B (Willimantic River crossing at Jones Crossing Road/Tolland Turnpike) were utilized, as a future water main could be extended to this area. The commercial development in the northeast corner of Coventry could also be connected to public water supply, potentially spurring additional jobs.

A benefit would be realized by the Town of Mansfield and the Town of Coventry in terms of increased tax revenue over existing levels since several existing and proposed projects would be expected to support development. This type of benefit may minimally be realized in the Town of Tolland.

In total, this alternative has the potential to provide a benefit to employment and the local economy through the development of construction jobs and long-term bioscience and service jobs. Indirect effects, such as the need for additional housing to support workers, may also occur. In order to ensure that development density is controlled along the enacted water main route, land use mitigation measures are proposed to restrict development along certain segments of the pipeline.

7.3.3 EXISTING WATER RATES

Property owners immediately adjacent to the water main would have the option to connect to public water service. Business owners in planned development areas would likely wish to connect to the public water system to relieve uncertainty with developing an adequate on-site source of water supply. Thus, CWC would provide water service to properties located adjacent to its water main in Tolland, Coventry, and Mansfield. The only exception would be in areas currently served in the town of Tolland.

Table 7.3-3 presents the routing options to Mansfield Four Corners. While all of the CWC routing scenarios connect to the University system, they do not all proceed directly to Mansfield Four Corners. Therefore, additional transmission piping through a water main extension would need to occur to serve that area.

TABLE 7.3-3
Water Service to Mansfield Four Corners under CWC Interconnection Scenarios

Connection Scenario	CWC Connection Point to University System	Potential Service Provider to Mansfield Four Corners		
		CWC	University	Mansfield*
#3A-1 / #3B-1	5.4 million gallon (MG) Reservoir in W-Lot	✓		
#3A-2 / #3B-2	16-inch transmission main on Hunting Lodge Road	✓*	✓	✓
#3A-3 / #3B-3	16-inch transmission main on North Hillside Road	✓		
#3A-4 / #3B-4	16-inch transmission main on North Hillside Road	✓		
#3A-5 / #3B-5	5.4 MG Reservoir in W-Lot	✓		

*via consecutive system by purchasing water from the University

CWC water rates for individual customers (based on 60,000 gallons of annual use at existing water rates) would be $556 per residential connection and $501 dollars per commercial connection. This is a higher cost than the water rates in the University system ($393 per year for a similar water usage).

CWC would also levy a charge for fire protection associated with the proposed pipeline. Note that areas already serviced by public water supply already have hydrants. It is assumed that a fire hydrant would be installed at least every 1,000 feet. Table 7.3-4 presents the number of hydrants expected along each pipeline route and the estimated cost to the Towns of Coventry and Mansfield.

The University's 2011 *Water Supply Plan* notes that annual revenue from the sale of water and provision of sewer service to non-University customers in 2009 was $861,902. The *Water Supply Plan* further notes that the amount of revenue generated from the sale of water was estimated to be 50% of this value, or approximately $431,000. Thus, much of the income from sales would be significantly reduced if CWC directly served these customers.

CWC and the Town of Tolland have made an agreement under which CWC water would be provided along part of Route 195 despite these customers continuing to be Town of Tolland customers. It is assumed that the Town of Tolland would break even under the terms of this agreement and that Tolland customers in the area would continue to pay Tolland rates under this scenario.

TABLE 7.3-4
Cost of Fire Service from CWC

Routing Scenario	Distance*	Number of Hydrants	Total Cost to Coventry per Year	Total Cost to Mansfield per Year
#3A-1	28,080	28	$1,080	$20,880
#3A-2	22,860	23	$1,080	$15,980
#3A-3	24,480	24	$1,080	$26,610
#3A-4	25,300	25	$1,080	$18,780
#3A-5	30,440	30	$1,080	$22,560
#3B-1	28,400	28	$2,400	$21,060
#3B-2	23,180	23	$2,400	$17,220
#3B-3	24,800	24	$2,400	$18,420
#3B-4	25,620	26	$2,400	$19,080
#3B-5	30,760	31	$2,400	$22,860

* Does not include North Hillside Road extension, which would have hydrants installed as part of the utility work with that project, nor areas of existing water service

7.3.4 PROPERTY OWNERSHIP AND EMINENT DOMAIN

As CWC is not proposing the use of any new water sources, and the majority of construction work would take place within existing roadway easements, this alternative will not require significant changes in property ownership. Acquisitions through eminent domain are not expected. The only potential impacts to property ownership under any of the scenarios include the following:

- Agreements are already in place with the Town of Tolland to utilize sections of the town's infrastructure (pipeline segment 10) including the existing pressure-reducing valve (PRV). Additional agreements or land purchases may be needed to install a PRV on pipeline segment 11 (Route 195 near Norwegian Woods), an interconnection meter pit on pipeline segment 21 (University interconnection), and additional PRVs within the current CWC system in Tolland.

- The only water main that would not be installed beneath a roadway (and not on University land) would be along pipeline segment 12B. An easement or other agreement may be needed to connect the pipe to the proposed pedestrian bridge.

- A utility easement may be necessary from RailAmerica, Inc. for installing water mains beneath the railroad that runs parallel to Route 32 in western Mansfield (pipeline segment 12A or 12B).

- Finally, a storage tank may be desired (although is not required) in the Mansfield Four Corners area to maintain proper system pressure. Consideration of such a tank will be dependent upon the final pipeline route and means of connection to the University system. If pursued, a transfer of property from the University or the purchase of property from a private entity would be required. The best areas for a tank (in likely order of increasing cost) would be:

    - A portion of the University property that is currently accessible from Route 195 and that would also be accessible from the eventual North Hillside Road extension. A portion of this area rises to approximately 685 feet in elevation near the existing agricultural fields. The

University could potentially cede a small area for the purposes of this project. The tank location is located approximately 2,480 feet from the intersection of Route 195 and Route 44.

- A privately-owned parcel off Middle Turnpike is currently vacant with portions used for agriculture. A portion of the parcel could potentially be purchased for the use of a storage tank. This property also has areas near 690 feet in elevation. The tank location is located approximately 2,000 feet from the intersection of Route 195 and Route 44.

- The parcel immediately east of the previous parcel is noted as timber or forest land. A portion of this parcel could potentially be purchased for the use of a storage tank. This property rises to over 720 feet in elevation on the western boundary. The tank location is located approximately 3,000 feet from the intersection of Route 195 and Route 44.

- A privately-owned parcel off Greenfield Lane could provide enough space for a tank and is approximately 690 feet in elevation. The property is located approximately 2,000 feet from pipeline segment 14 at the intersection of Route 195 and Route 320.

A significant construction period or long-term impacts to property ownership are not expected.

7.4 COMMUNITY FACILITIES AND SERVICES

The community facilities and services along the 16 potential pipeline segments associated with the various CWC interconnection scenarios are summarized in Table 7.4-1 and in more detail in the following sections.

TABLE 7.4-1
Summary of Community Facilities and Services
by Pipeline Segment Along CWC Interconnection Routes

Pipeline Segment	School?	Potential Benefit from Fire Protection?	Recreation Area?
8	No	Interstate highway	No
9	No	Already served by Tolland	No
10	No	Already served by Tolland	No
11	No	Residential	Yes
12A	No	Commercial	No
12B	No	Residential	Proposed
13	No	Residential	No
14	No	Residential and Commercial	No
15	No	Residential	No
16	No	Residential	No
17	Yes	Residential	Yes
18	No	Residential and Commercial	Yes
19	No	Residential and Commercial	No
20	No	Residential and Commercial	No
21	Yes	Will be served by UConn	Proposed

7.4.1 EDUCATION

Regardless of the CWC interconnection scenario, the proposed research spaces on the North Campus and the Depot Campus would be fully realized under this alternative. This development will provide additional educational and research opportunities to University students and faculty.

As shown in Table 7.4-1, only pipeline segment 17 passes by a non-University educational facility. This is Goodwin School on Hunting Lodge Road, which is currently served by a well. Scenarios #3A-2 and #3B-2 call for installing a water main past Goodwin School, providing an opportunity for fire protection and public water supply to this facility. However, access to the school would be temporarily impacted during the construction period. Performing construction in this area during the summer would be the best method of avoiding this impact.

At full buildout of lands adjacent to the proposed pipeline routes, modest population growth could occur as a result of development by an estimated 763 people (refer to Table 7.3-2), with an associated increase in school-aged children. It is likely that some or potentially all of this land could develop without public water supply. In either case, significant impacts to education services in Mansfield are not expected.

7.4.2 PUBLIC SAFETY AND EMERGENCY SERVICES

The primary benefit to fire protection associated with this alternative is the fact that an interconnection main could provide a large quantity [more than 1,000 gallons per minute (gpm) for two hours] of water for fire flows at locations along the pipeline route. This would provide a benefit to Tolland, Coventry, and Mansfield. The longer pipeline routes would provide a greater benefit in terms of the availability of fire protection water, and commercial nodes located in Coventry and Mansfield would particularly benefit from the availability of fire protection water. The Town of Coventry has indicated that fire protection is desired along Route 195.

The construction period associated with this alternative will require the use of state and local police services to provide maintenance and protection of traffic.

7.4.3 PARKS AND RECREATION

Only one recreational facility exists in Tolland along a potential pipeline route. This is the former Dimock property in the southeastern corner of Tolland that is now dedicated open space and used for passive recreation. Parks or recreational areas do not currently exist in Coventry along Route 195 or Jones Crossing Road. However, if Crossing Option B were selected, a pedestrian bridge would be erected across the river at Jones Crossing Road on the former bridge abutments. This would create a recreational activity in the area and could lead to additional trails in the Mansfield and Coventry area that would likely connect to the Dimock property in Tolland. The creation of this pedestrian bridge would become an integral part of a regional hiking trail network along the Willimantic River.

A few parks and recreational facilities are located in Mansfield along the potential pipeline routes. Goodwin School (pipeline segment 17) is an elementary school with a multiuse ball field, outdoor basketball hoops, a playscape, and an indoor gym and auditorium. The Villa Hills Golf Course (pipeline segment 18) is a privately owned nine-hole golf course open to the public.

These areas are currently serviced by wells; a connection to a public water system could be beneficial to provide a backup supply for irrigation.

A minimal impact to parks and recreation would be expected during the construction period if Connection Option 2 (Hunting Lodge Road) was utilized since there would be construction in the vicinity of Goodwin School. The implementation of Connection Option 4 or 5 would cause a minimal impact to the golf course during construction.

7.4.4 PUBLIC TRANSPORTATION

The creation of educational and research facilities on North Campus and the Depot Campus would likely require an expansion of shuttle service to and from the University. The proximity of Mansfield Four Corners to the Technology Park suggests that a University stop could be added to Mansfield Four Corners as well, particularly if properties are redeveloped into shops, restaurants, and mixed-use housing. In addition, redevelopment of Mansfield Four Corners could create the demand necessary to add additional Windham Region Transit District (WRTD) stops in the area. Additional stops are unlikely to be added in Coventry and Tolland under this alternative.

A minor and temporary impact to public transportation will be realized during construction due to the amount of pipeline being installed along existing major bus routes. Since the majority of the proposed pipelines would be installed far from areas currently serviced by the University or WRTD, only a minimal impact to public transportation is expected.

7.5 AESTHETIC AND CULTURAL RESOURCES

The potential interconnection routes under this alterative traverse portions of Tolland, Coventry, and Mansfield. Project areas in the town of Vernon and the western portion of Tolland would lie within areas already serviced with public water. Thus, potential impacts to aesthetic and cultural resources in these areas would be minimal and limited to visual impacts during the construction period. The potential impacts to aesthetic and cultural resources in the remaining study area are described below.

Town of Coventry

Potential pipeline routes in Coventry include Route 195 and Jones Crossing Road. Only one cultural resource is identified in this area (Storrs Community Church). This area is predominantly residential/agricultural in nature, with generally sparse development along the roads. The vicinity of the Willimantic River offers scenic vistas but only by car since pedestrian access over the bridge is limited. The implementation of Crossing Option B would allow for the creation of a pedestrian bridge over the river that would heighten the scenic value of this area.

The development potential in this area is limited to only a few parcels due to the presence of the Willimantic River floodplain. An existing large parcel could potentially be subdivided and connected to public water service. Such development is not expected to significantly impact aesthetic or cultural resources in the town of Coventry. Any development in this area would require review at the local level.

Town of Mansfield

The entire town of Mansfield is designated as a scenic resource in the 2006 *Plan of Conservation and Development.* Much of the proposed CWC pipeline routes through Mansfield pass areas that are predominantly residential in nature, with generally sparse development along much of the roads. Trees grow right to the edge of the roadway, inhibiting long scenic views in most areas, instead providing a shady, tree-lined drive. Many areas are undeveloped, featuring forests with little understory or large open wetlands, such as Cedar Swamp along Route 195. The view over Horse Barn Hill from just south of the intersection of Moulton Road and Route 195 (pipeline segment 19) is a particularly notable vista for University students, staff, and visitors as well as residents of Mansfield.

As new water mains will be installed within existing roadways, long-term impacts to aesthetic and visual resources are expected to be minimal. The selection of a site for a new water tank in Mansfield Four Corners will need to carefully consider aesthetics. Crossing Option B would increase the availability of scenic vistas of the Willimantic River in Mansfield via a new pedestrian bridge. Coordination with the various related commissions and committees in the Town of Mansfield will be essential to a successful project.

Development density increases closer to the University, with commercial areas located along Route 44 and Route 195 that include gas stations, grocery stores, restaurants, banks, and other shops. Additional apartment buildings and condominium complexes are also located close to campus. A large trailer park (Jensen's) is located on the south side of Route 44 in the western area of Mansfield Four Corners. Mansfield Four Corners is considered a historic village and is located along each of the potential water main scenarios. While the center of this village is located at the intersection of Moulton Road and Daleville Road with Route 44, many of the commercial buildings in this village are located near the intersection of Route 44 and Route 195. These commercial buildings are dilapidated and/or vacant and therefore in need of redevelopment. An interconnection with CWC would provide sufficient water supply to promote redevelopment in this area. Coordination with the Planning and Zoning Commission will be necessary to ensure that new development and redevelopment in Mansfield Four Corners is consistent with the historic aspects of this village.

The potential pipeline routes pass by several historical properties and sites as noted in Mansfield's 2006 *Plan of Conservation and Development.* These properties are located on Tolland Turnpike, Baxter Road, Route 44, and Route 195. The extension of public water service past these properties will not impact their historic nature.

The 2006 *Plan of Conservation and Development* identifies areas of archaeological sensitivity, historic site areas, and prehistoric areas in Mansfield. Areas of sensitivity are located along potential pipeline segments 12A, 12B, and 13. Prehistoric areas are identified along Route 195 along pipeline segments 14 and 19. The Tilden Cemetery is also located adjacent to pipeline segment 12A. The State Archaeologist and the State Historic Preservation Officer would need to be consulted prior to beginning work in these areas, as well as the Mansfield Historic District Commission and the Cemetery Committee to ensure no impact. Other, cultural resources are located along potential pipeline routes, including the Saint Paul's Collegiate Church on Route 195 (pipeline segment 14). Since almost all of the pipeline will be conducted within previously disturbed roadway rights-of-way, impact to sensitive resources is not expected.

Construction-related impacts to aesthetic and cultural resources in Mansfield are expected to be minor and temporary. The nature of roadway construction requires a high amount of visibility for safety purposes.

Town of Tolland

The 2010 Tolland *Plan of Conservation and Development* has identified a primary greenway along the Willimantic River. This greenway would connect into the proposed pedestrian bridge over the Willimantic River in Coventry and Mansfield under Crossing Option B. No other aesthetic or visual resources have been identified along Route 195 in Tolland.

The Shenipsit Reservoir in western Tolland and Vernon would be the source of water for this interconnection. This reservoir is an aesthetic resource for both towns. CWC oversees the recreational use program at the reservoir for the convenience of local walkers, boaters, and fishermen. No impact would occur as a result of an interconnection with the University and Mansfield.

Only one cultural resource was identified south of Interstate 84. The River of Life Christian Fellowship is a house of worship located along pipeline segment 10. Historic homes may also be located along Route 195 although the installation of a new water main would be unlikely to directly affect these properties.

7.6 PUBLIC WATER SUPPLY

This alternative would increase available water supply principally within the town of Mansfield and at the University. Specific implications for each water system located along the interconnection route are described in this section.

7.6.1 TOWN OF TOLLAND WATER SYSTEM

CWC has entered into an agreement for a direct interconnection with the Tolland system on Route 195. This allows CWC to utilize a portion of the existing Tolland system for a regional pipeline. Under this agreement, existing and future Tolland customers along Route 195 would continue to be Tolland customers but would be served by CWC water. This change would have the effect of increasing Tolland's MOS by reducing demands on Tolland's water sources. Table 7.6-1 presents the effect of the agreement between CWC and Tolland on Tolland's MOS.

TABLE 7.6-1
Projected Water Demands and MOS in the Tolland System Under the CWC-Tolland Agreement

Year	ADD (million gallons)	ADD MOS	MMADD (million gallons)	MMADD MOS	PDD (million gallons)	PDD MOS
2013	0.1795	1.70	0.2333	1.30	0.3590	1.18
2020	0.2180	1.40	0.2830	1.08	0.4260	1.00
2050	0.3050	1.00	0.3960	0.77	0.6000	0.71

Note: Pink shading indicates MOS below 1.15.

The connection with CWC would help Tolland to meet its ADD and MMADD through 2020. PDD would be marginally less than available supply such that PDD would likely be able to be met through storage. Additional supply sources would still need to be identified by Tolland through 2050. CWC has indicated that an emergency interconnection will be established with the Tolland system at Anthony Road, which could potentially be utilized by Tolland to purchase water from CWC toward meeting future projected demands with a sufficient MOS.

7.6.2 OTHER PUBLIC WATER SYSTEMS

Additional areas of potential water demand in the town of Mansfield were identified in the 2002 Mansfield *Water Supply Plan*. Several small community water systems are located along potential CWC pipeline routes as follows:

- Norwegian Woods Apartments in Tolland is served by two wells and requires iron and manganese removal. The 2002 Mansfield *Water Supply Plan* also notes that this system has had bacteria issues. This apartment complex could potentially connect to the water main. It has a reported water demand of 18,000 gpd. The Town of Tolland had been planning to serve this development in the long term.
- The Planned Business Area near the intersection of Route 195 and Route 32 could support businesses with an estimated water demand of 5,000 gpd. This area was identified in the 2002 Mansfield *Water Supply Plan*.
- Rosal Apartments is located near Mansfield Four Corners and has a water demand of approximately 1,800 gpd. This area is already included in the projected water demands for Mansfield Four Corners.

The following small community systems are identified along potential pipeline routes that may interconnect for system redundancy but are unlikely to be directly served:

- The Stone Pond Condominiums in Tolland are currently located near the Tolland water system but are not connected. The 2002 Mansfield *Water Supply Plan* noted that this system has only one well and requires iron and manganese removal. The pipeline could provide a backup supply source for this system.
- The Rockridge Condominiums are located along pipeline segment 13. According to the 2002 Mansfield *Water Supply Plan*, this system has only one well that requires iron removal. The pipeline could provide a backup supply source for this system.
- The Renwood Condominiums are located near the corner of Baxter Road and Route 195. This system is serviced by three wells and reportedly has occasional issues with pH according to the 2002 Mansfield *Water Supply Plan*. This system could connect to a pipeline for redundancy.
- The Jensen's Rolling Hills system on Route 44 has an ADD of approximately 0.0225 mgd that is included in the projected Mansfield Four Corners demands. This system is currently owned by CWC and had excellent water quality as of the 2002 Mansfield *Water Supply Plan*. This system could interconnect with a CWC pipeline if available.

Finally, several small non-transient non-community (NTNC) and transient non-community (TNC) systems lie along potential pipeline segments associated with a CWC interconnection as follows:

- Existing systems along pipeline segments 8, 9, and 10 are unlikely to connect to the water system since they are already in the area of existing public water systems but have not connected.
- Mansfield X-tra Mart is included in the Planned Business Area near the intersection of Route 195 and Route 32 discussed above.
- The Holiday Mall is located just north of Mansfield Four Corners and may wish to connect. This facility is included in the projected Mansfield Four Corners demands.
- The Public America in Mansfield Four Corners is already included in demands presented above.
- Goodwin School had only one active well at the time of the 2002 Mansfield *Water Supply Plan*, but the water supply was considered to be good. This system may interconnect with a pipeline under Connection Option #2 and could present an additional incremental demand of 5,500 gpd.
- Yukon Jack's on Route 44 has an associated golf course and may wish to connect for source redundancy or irrigation purposes. Potential demands at this business are included in the projected Mansfield Four Corners demands. While the water usage at this restaurant and golf course is unknown, it is assumed to be less than 0.05 mgd since a diversion registration or permit for this property is not listed on the Connecticut Department of Energy & Environmental Protection (CT DEEP) website (updated through July 1, 2012).
- The demands at 603 Middle Turnpike are included in the Mansfield Four Corners demands presented above.

7.7 OTHER PUBLIC UTILITIES AND SERVICES

7.7.1 SANITARY SEWER

Sanitary sewer service is available coincident with public water service in Tolland and Vernon. No impact to these areas is expected. However, existing sewer mains would need to be avoided during construction.

Impacts are not expected along Route 195 in Tolland in areas that do not currently have sewer service. Any future development would either construct on-site septic systems or sewer service could be potentially extended to service these areas, subject to the agreement between Tolland and Vernon.

Impacts are not expected to the Coventry Water Pollution Control Facility (WPCF) or sewer system as there is no sewer service on the Route 195 corridor, and Coventry currently has no plans to expand sewer service into that area. In addition, no impact on wastewater loading from this facility to the Willimantic River will result since there will be no instream flow impacts along the Willimantic River.

The proposed overlay zones in Mansfield will restrict development density. As such, expansion of sanitary sewer service in Mansfield would be associated with new development on the University campus and the proposed extension of the sewer main to Mansfield Four Corners.

The 2007 *Water and Wastewater Master Plan* concluded that the capacity of the University's WPCF is sufficient for future wastewater treatment. Average daily flows at the WPCF typically average 27% to 44% (0.81 mgd to 1.32 mgd) of its average day capacity while peak flows can

utilize up to 90% of the plant's peak hourly capacity as a result of inflow and infiltration to the system, independent of the number of users discharging to the system. The University continues to take measures to alleviate this condition. Based on the likely additional flows to the University's WPCF (assuming the majority of new water customers would discharge to the sanitary sewer), the facility is believed to have sufficient capacity.

7.7.2 STORMWATER SYSTEMS, BRIDGES, AND CULVERTS

A number of bridges, cross culverts, and stormwater systems are located along the potential pipeline segments associated with the interconnection scenarios with CWC. Table 7.7-1 summarizes these watercourse crossings. Photographs of several of these crossings are presented in Appendix C.

TABLE 7.7-1
Summary of Stormwater Systems by Pipeline Segment
Along Potential CWC Interconnection Routes

Pipeline Segment	Bridge	Storm Drainage Systems	Cross Culverts	Comment
8	Interstate 84	Yes	No	Pipe on bridge
9	Skungamaug River	Yes	None observed	May need to hang pipe on side of Skungamaug bridge or directionally drill
10	None	Yes	Yes	This area has existing water mains so stormwater systems only need to be avoided under the higher transfer scenarios (>2.0 mgd).
11	None	Yes	Yes	Some of these culverts have less than 12" of cover.
12A	Willimantic River	Yes	Yes	Hang pipe on Route 195 bridge or directionally drill beneath river
12B	Willimantic River	No	Yes	May need to hang pipe on Clark Brook box culvert or directionally drill. Hang pipe on proposed pedestrian bridge over Willimantic River. Cross-culvert on Tolland Turnpike has limited cover.
13	None	Swales	Yes	Intermittent stream
14	Cedar Swamp, Cedar Swamp Brook	Yes	Yes	Corrugated metal pipe provides outlet from Cedar Swamp.
15	None	No	Yes	Several intermittent streams
16	None	Route 44	Yes	
17	None	Yes	Yes	Storm drainage near school
18	Cedar Swamp Brook	Yes	None observed	Bridge has existing utility crossing. Nearby pedestrian bridge could also be used to cross.
19	None	Yes	Yes	
20	None	Yes	Yes	Nearby pedestrian bridge
21	None	Future	Future	Future North Hillside Road extension

The major crossings affecting all CWC interconnection scenarios are the Interstate 84 bridge, the Skungamaug River bridge, and the Willimantic River. CWC proposes to attach a water main to the Interstate 84 bridge, but a design plan has not yet been determined for the Skungamaug River bridge. A pipe could be hung on the side of the bridge if enough clearance above the bridge is not available beneath the roadway, or directional drilling could occur beneath the riverbed. At the Willimantic River, a pipe would either be hung on the Route 195 bridge or attached to the proposed pedestrian bridge over the Willimantic River. These are design issues that can affect the project cost but should not impact the viability of the stormwater infrastructure.

Many minor crossings will also occur during construction. Clark Brook (pipeline segment 12B) and Cedar Swamp Brook (pipeline segments 14 and 20) could present construction-related challenges as could smaller shallow culverts beneath roadways. The installation of potential water mains and pump stations will be designed to avoid interference with existing stormwater systems. If modifications to stormwater systems are necessary, they will need to be evaluated within the design phase of the eventual project.

New stormwater systems will be developed in concert with any new University development. These will need to meet University design standards. Drainage systems associated with new development in the town of Mansfield (such as Mansfield Four Corners) would be evaluated through local and potentially state permitting processes.

7.7.3 ENERGY, ELECTRICITY, AND NATURAL GAS

A proposed interconnection with CWC would result in the following additional energy demands over current levels:

- Additional energy demands from additional pumping at the Powder Hollow, Hunt, and Preston wellfields in the Western System
- Additional energy demands at the Rockville WTP for treatment
- Additional energy demands for pumping
- Additional energy demands in new buildings on the North Campus and the Depot Campus that would be serviced by the proposed water supply
- Additional energy demands in the form of vehicle fuel and additional office work (computers, etc.) due to an increased service area for CWC operations and maintenance personnel
- Additional energy demands (electricity, fuel) from new development and redevelopment spurred by the presence of the water main

Electrical Service

Incremental electrical demands would be realized by CWC under this alternative, including an incremental increase for producing more water per day, for treating additional water at Rockville WTP, to supply pumping station demands, and for additional personnel and equipment. These operational costs would be borne by CWC and passed on to its customers and rate payers.

Electrical service would also be extended into any new developments including those spurred by the presence of the water main. New University buildings would partially or fully be serviced with electricity from its Central Utility Plant (CUP). As exact building uses are not known at this time, estimates of electrical service cannot be provided. However, it is assumed that Connecticut

Light & Power has sufficient supply to provide electrical service to any related incremental increases and new development.

Natural Gas Service

Extension of natural gas is expected to occur to new buildings in North Campus and the Depot Campus; new buildings in the vicinity of Mansfield Four Corners may also be serviced with natural gas. While an estimated amount of new usage of natural gas in these areas cannot be quantified at this time as buildings have not been designed, it is assumed for the purposes of this EIE that sufficient supply exists to serve these developments. In addition, natural gas usage to generate electricity at the CUP may increase to support future University development.

Coordination with utilities will be necessary to determine the depth of gas pipelines during the design phase in order to avoid interference. Additional protective controls such as extra casing may be necessary in the vicinity of the gas pipelines. No direct impact to natural gas service or existing pipelines (other than additional usage and service area) is expected.

Other Energy Sources

The proposed action is expected to have an incremental impact on the amount of fuel utilized for backup generation at pump stations. Construction-related traffic delays will also cause an incremental increase in fuel consumption during the construction period. In addition, the construction period will involve a direct consumption of fuel by equipment that cannot immediately be quantified. Indirect impact to these fuel sources would likely occur through increased demand following development and redevelopment activities.

7.7.4 TELECOMMUNICATIONS SERVICE

Expansion of telecommunications service is expected to occur to any new buildings developed as a result of the availability of water supply. It is assumed for the purposes of this EIE that sufficient capability exists to serve these developments. For example, the University Information Technology Services (UITS) has indicated that it will be able to service any new buildings on the North Campus and the Depot Campus without issue. Coordination with existing utilities will be necessary to determine the depth of any underground wires during the design phase in order to avoid interference. No direct impact to telecommunications providers (other than additional usage and service area) is expected.

7.8 TRAFFIC, PARKING, AND OTHER TRANSPORTATION

An interconnection with CWC could have several impacts related to parking, traffic, and other transportation. Table 7.8-1 presents the characteristics of roadways along potential pipeline segments associated with the CWC interconnection scenarios. The majority of these routes are well traveled roadways.

TABLE 7.8-1
Traffic Characteristics Along Potential CWC Pipeline Segments

Pipeline Segment	Distance (feet)	Road Type	Traffic Count	Speed Limit (mph)	Source
8T	27,190	Arterial	Varies*	Varies	2008 CTDOT
8	790	Arterial	12,100	35	2010 CTDOT
9	4,750	Arterial	19,800	35	2010 CTDOT
10	2,870	Arterial	14,600	40	2010 CTDOT
11	9,300	Arterial	11,900	45	2010 CTDOT
12A	3,820	Arterial	11,900	45	2010 CTDOT
12B	4,140	Local	-	25	-
13	1,630	Arterial	11,500	50	2010 CTDOT
14	8,190	Arterial	11,500 / 14,800**	45	2010 CTDOT
15	4,560	Local	1,900	30	1998 Town of Mansfield
16	330	Arterial	7,400	40	2010 CTDOT
17	1,680	Local	2,114	30	2008 Town of Mansfield
18	4,120	Arterial	7,400	40	2010 CTDOT
19	5,140	Arterial	15,600	40	2010 CTDOT
20	1,540	Arterial	9,000	40	2010 CTDOT
21	3,400	Future Collector	-	N/A	-

* Varies from 7,300 to 12,500 along Route 30, Route 74, and Route 195. Side streets have less traffic.
** Route 195 North / South of Route 320
CTDOT = Connecticut Department of Transportation

Construction of interconnection pipeline would cause temporary traffic impacts along the Route 195 corridor during the construction period. Pipeline distances are relatively similar under each scenario. Construction in most areas would be constrained to one lane, resulting in alternating one-way traffic along most of the pipeline route. State Police traffic protection would likely be required. Construction activities may also temporarily impact access to businesses and homes. Bikeways and sidewalks in the vicinity of the University (such as along Route 44) may have temporary closings during the construction period.

The routing scenarios that utilize local roads (Crossing Option B, Connection Option #2, and Connection Option #3) would have the least overall impact to traffic (in terms of volume) during the construction period. Efforts would be made during the construction period to not restrict access to homes and businesses any more than necessary. In addition, performing construction work during the summer period would minimize the volume of traffic passing the construction area near the University.

The New England Central Railroad in western Mansfield would need to be crossed under each scenario. Drilling or jacking beneath the railroad would need to occur. Rail America, Inc. has indicated that a construction schedule to minimize railroad traffic impacts would be coordinated during its permitting process.

7.9 WETLAND RESOURCES

An interconnection with CWC has the potential for direct wetland impacts due to the construction of new infrastructure as well as the potential for long-term impacts related to drawdown at CWC supply sources. These are described in the following sections.

7.9.1 EXISTING WETLAND AREAS ALONG POTENTIAL CWC PIPELINE SEGMENTS

The pipeline segments associated with an interconnection with CWC pass a variety of wetlands and watercourses. Refer to Figure 7.9-1 for a depiction of inland wetland soils and watercourses adjacent to potential pipeline segments. Table 7.9-1 summarizes the wetlands found along each pipeline segment for the CWC interconnection.

TABLE 7.9-1
Wetlands Along Potential CWC Pipeline Segments

Pipeline Segment	Number of Adjacent Wetland Areas	Total Adjacent Wetland Distance (feet)	Comment
8T	5	480	Hockanum River floodplain, several wetlands, Paulk Hill Brook
8	0	0	Potential drainage swales
9	4	1,440	Skungamaug River floodplain, forested wetland, intermittent watercourses
10	1	410	Forested wetland
11	1	110	Intermittent watercourse
12A	2	1,070	Willimantic River floodplain, forested wetland
12B	2	1,170	Willimantic River floodplain, forested wetland
13	2	1,675	Intermittent watercourses
14	3	1,405	Nelson Brook / wetland / Cedar Swamp / wetland
15	5	985	Nelson Brook / pond outlet / wetland / two tributaries to Nelson Brook
16	0	0	-
17	0	0	-
18	2	350	Logged wetland / Cedar Swamp Brook
19	3	170	Intermittent stream / forested wetland, dug pond, forested wetland
20	1	50	Forested wetland
21	2	420	Intermittent watercourse / wetland, vernal pool (Final Environmental Impact Statement)

The wetlands presented in Table 7.9-1 are described in more detail below.

- Pipeline Segment 8T: The Hockanum River and Paulk Hill Brook are the major crossings along this segment. Several small forested wetlands and drainage ditches also exist along this route.
- Pipeline Segment 9: Besides the Skungamaug River crossing, a forested wetland associated with the Skungamaug River is located on the north side of Route 195 northwest of the Stone Pond Condominiums in Tolland. Two intermittent watercourses also cross Route 195 southeast of Goose Lane.

- Pipeline Segment 10: A forested wetland area is located east of the USDA property.

- Pipeline Segment 11: An intermittent watercourse drains a forested wetland on the northeast side of Route 195. This watercourse is conveyed beneath Route 195 to discharge into Clark Brook.

- Pipeline Segment 12A: A large forested wetland lies between Route 195 and Tolland Turnpike in Mansfield. The wetland includes an intermittent watercourse with a three-foot wide channel. The watercourse and most of the wetland are located more than 10 feet below the nearby roadway elevations. Vegetation includes red maple, yellow birch, common winterberry, spicebush, skunk cabbage, and princess pine.

- Pipeline Segment 12B: Clark Brook is conveyed beneath Jones Crossing Road in Coventry. The brook has an associated forested/scrub-shrub wetland. Vegetation along the brook includes red maple, common winterberry, speckled alder, spicebush, multiflora rose, and sensitive fern. The floodplain wetlands at the Willimantic River include red maple, sugar maple, white oak, sycamore, silky dogwood, winged euonymus, and soft rush. Tolland Turnpike abuts a forested wetland including red maple, yellow birch, common winterberry, spicebush, skunk cabbage, and princess pine.

- Pipeline Segment 13: An intermittent watercourse and associated forested wetland are bisected by Route 195. The intermittent watercourse is a tributary to Nelson Brook.

- Pipeline Segment 14: Several wetlands are present along this route:

    - Nelson Brook is conveyed to the southwest beneath Route 195; the brook has an associated forested wetland.
    - Route 195 also bisects Cedar Swamp along this reach, which supports scrub-shrub and emergent marsh wetlands. Vegetation in Cedar Swamp includes Atlantic white cedar, red maple, buttonbush, highbush blueberry, swamp rose, steeplebush, common winterberry, northern arrowwood, tussock sedge, marsh fern, royal fern, sensitive fern, cinnamon fern, soft rush, woolgrass, soft stem bulrush, and several other sedges and rushes. This swamp is the headwaters of Cedar Swamp Brook.
    - A small forested wetland area and intermittent watercourse crossing exists before the entrance to Saint Paul's Church.
    - A palustrine forested wetland is bisected by Route 195 between the firehouse and Route 320. Vegetation in this wetland is predominantly red maple with trees ranging in size from pole (less than four-inch diameter at breast height) to 10-inch diameter at breast height. The understory is moderately dense consisting of common winterberry, northern arrowwood, highbush blueberry, silky dogwood, multiflora rose, skunk cabbage, and sensitive fern. This wetland is the headwater of an unnamed tributary to Cedar Swamp Brook.

- Pipeline Segment 15: Nelson Brook is conveyed to the southwest beneath Baxter Road. A narrow intermittent watercourse acts as the outlet of a small pond and has an associated wetland. A small pond lies to the southwest of the road; it is recharged by an intermittent watercourse that also drains from the northeast. A perennial tributary to Nelson Brook and an intermittent tributary to Nelson Brook are conveyed beneath Baxter Road near Route 44.

These watercourses drain from a series of ponds visible from the street. Vegetation within these forested wetlands includes red maple, Norway spruce, white pine, and sugar maple.

- Pipeline Segment 18: A forested wetland trough is located west of the Birch Road and Route 44 intersection about eight feet below the roadway elevation. This wetland has been recently logged. Cedar Swamp Brook is conveyed to the south just west of the trailer park. The brook has a narrow wetland corridor near Route 44.

- Pipeline Segment 19: An intermittent watercourse drains a farm field just north of Mansfield Hardware. The watercourse is conveyed to the northeast beneath Route 195. Farther north, a dug pond exists on the west side of the road with a culvert conveying flow to the northeast. Just before the Route 44 intersection, there is a drainage system conveying flow from the forested wetland to the southwest of the roadway to the northeast.

- Pipeline Segment 20: A forested wetland is conveyed under Route 44 between Rosal Apartments and the former Zenny's restaurant. The wetland flows from south to north through an 18-inch pipe.

- Pipeline Segment 21: The reader is directed to the FEIS for impacts related to wetlands, vernal pools, and intermittent watercourses along this pipeline segment.

Pipeline segments associated with an interconnection with CWC lie entirely beneath paved roadways with a few exceptions. The potential pedestrian bridge (Crossing Option B) has a higher probability of resulting in minor wetland impacts since structural improvements such as new foundations may be needed to support the pedestrian bridge. Hanging pipes on the sides of culverts or bridges may be an option (such as at the Willimantic River under Crossing Option A), or directional drilling could be utilized to avoid wetlands. These activities will not result in a wetland impact but may still require wetland permits. The use of best construction management practices for sedimentation, erosion, and debris controls would result in minimal impact to adjacent wetlands along the remainder of potential pipeline routes.

The above wetland areas were identified during reconnaissance by a certified soil scientist and professional wetland scientist based on the presence of perennial streams, intermittent streams, and state wetland soils. Wetlands and vernal pools will be delineated along the selected pipeline scenario by a professional wetland scientist during the design phase.

7.9.2 POTENTIAL DRAWDOWN IMPACTS

A pipeline and interconnection with CWC would utilize water from Shenipsit Reservoir to supply potable water to the University and Mansfield. Meanwhile, CWC would rehabilitate the Powder Hollow, Hunt, and Preston Wellfields to provide incremental supply within the existing diversion registration limits. Water from the wells would be distributed to areas of the Western System that already use the well water (portions of Enfield, East Windsor, and Somers) but that were formerly provided with a portion of the water produced from Shenipsit Reservoir.

Potentially affected wetlands will likely include those associated with the Powder Hollow, Hunt, and Preston Wellfields. However, these wells were formerly used at their registered diversion rates prior to the consolidation of the Western System and the related hydraulic improvements as

they were relied upon much more heavily to supply their surrounding environs. For example, the Preston Wells were pumping at maximum permissible rates as recently as five years ago to meet demands in Somers prior to the interconnection of the Somers System with the Western System in 2008. Wetlands near these water supplies have been subject to cyclic seasonal changes in water levels. As each CWC wellfield will continue to operate within the confines of its diversion registration, only a slight incremental impact to wetlands at those wellfields is expected.

Potentially affected wetlands also lie around the perimeter of Shenipsit Reservoir. As with the wetlands associated with the wells described above, the wetlands around the reservoir have coexisted with fluctuating water levels in the past. In fact, historical fluctuations of the reservoir have likely exceeded present-day fluctuations as the industrial customer base in the Rockville section of Vernon was heavily dependent on water.

7.10 BIOLOGICAL ENVIRONMENT

Some clearing is believed to be required under this alternative. This would be limited to road edges where pipelines, pressure-reducing valves, or meter pits are installed as well as any clearing required for a proposed storage tank in Mansfield Four Corners. Clearing will be minimized in order to preserve as much of the existing environment as possible.

The Natural Diversity Date Base, Technology Park Final Environmental Impact Statement (FEIS), and 2002 Mansfield *Water Supply Plan* reference several State-Listed species that have been identified along potential pipeline routes associated with the CWC alternative. These include grasshopper sparrows, showy lady's slipper, vesper sparrows, American kestrels, bobolinks, eastern meadowlarks, savannah sparrows, and wood turtles. Qualified personnel would need to perform a biological survey along the proposed construction route to determine if these species are present and to set a construction timetable to avoid these species. This would presumably be conducted as part of the Water Diversion permitting process through CT DEEP.

7.11 INLAND FISHERIES

While water for the potential pipeline would be provided from Shenipsit Reservoir, the current withdrawal rate from Shenipsit Reservoir would not change in the short term. Instead, CWC would utilize the Powder Hollow, Preston, and Hunt Wellfields to make up the volume of water directed into the pipeline to the University and Mansfield. Redevelopment activities at these wellfields would be necessary to increase the volume of withdrawals, but this work is not expected to have an impact on fisheries. Minimal long-term impacts to fisheries are likewise anticipated. The following surface waters flow near the existing CWC supply sources:

- The Scantic River flows approximately 36 miles, originating at Tray Hollow Pond in Stafford, Connecticut. The river flows northwesterly into Monson, Massachusetts and continues westerly through Hampden, Massachusetts before re-entering Connecticut in the town of Somers. The river then continues to flow west through Enfield (in close proximity to the Powder Hollow wells) before flowing southerly through East Windsor (in close proximity to the Hunt wells) to finally join the Connecticut River in South Windsor.

- The Gulf Stream flows a short distance from the Stafford/Somers town line, through Somers before joining the Scantic River. The Preston wells are located near this watercourse.

The transfer of water through a pipeline to Mansfield has the potential to require withdrawals from the three wellfields above current withdrawal rates but not above historical withdrawal rates (or registered diversions). High groundwater withdrawals were occurring as recently as 2008 at the Preston Wellfield as it was the primary source of supply for the Somers System prior to its consolidation with the Western System.

The Scantic River drainage basin is already heavily allocated to public water supply, with additional groundwater withdrawals in the basin occurring for Hazardville Water Company. The improvements planned by CWC to enable provision of water to the University and Mansfield would result in the usage of groundwater closer to its point of origin in Somers, Enfield, and East Windsor. It has long been recognized that the use of water in its source basin is consistent with the ideologies behind the Water Diversion Policy Act. The incremental withdrawals from the Powder Hollow, Preston, and Hunt Wellfields for nearby distribution and consumption are consistent with this policy.

Since infrastructure is already in place at Shenipsit Reservoir to perform withdrawals for water supply and to manage releases, no fisheries habitat impacts are immediately expected from construction. Fisheries habitat impacts along the proposed pipeline routes are also expected to be negligible since no in-water work will be conducted.

The use of Shenipsit Reservoir water in Mansfield will constitute an interbasin transfer although under existing conditions withdrawals from the reservoir are partly utilized outside of the Hockanum River basin. The influx of additional water into the Willimantic River basin (via the University's WPCF outflow) is expected to have a minimal benefit to fisheries habitat along the river. Withdrawals from the Shenipsit Reservoir can be mitigated through continued releases from the Shenipsit Reservoir to the Hockanum River, to be supplanted in the future with releases that are consistent with Connecticut's streamflow regulations.

In the long term, increased transfers of water through the pipeline to the University and Mansfield would be supported by withdrawals from the Shenipsit Reservoir rather than any additional withdrawals from wellfields in CWC's Western System. By this time, CWC would be operating the Shenipsit Reservoir with a different release under the recently approved Streamflow Standards and Regulations for Connecticut. The future Class 3 releases from Shenipsit Reservoir would be as listed in Table 7.11-1.

As the current reservoir release is a relatively constant 3.26 cfs (excepting a spring freshet release), future releases from the reservoir may be lower during certain periods of the year than at present. However, releases may be higher during other periods, particularly during the spring months. CWC has indicated that the Shenipsit Reservoir will be fully compliant with the new release rules when required.

TABLE 7.11-1
Future Class 3 Releases from Shenipsit Reservoir

Bioperiod	Minimum Required Release (Dry/Wet)[1]	Minimum Discharge Released (cfs)[2]
Overwinter (December 1 to February 28/29)	Bioperiod Q99	3.05
Habitat Forming (March 1 to April 30)	Bioperiod Q99	12.4
Cluepid Spawning (May 1 to May 31)	Bioperiod Q95	10.8
Resident Spawning (June 1 to June 30)	Bioperiod Q90	4.80
Rearing and Growth (July 1 to October 31)	Bioperiod Q80 / Bioperiod Q50	2.14 / 4.98
Salmonid Spawning (November 1 to November 30)	Bioperiod Q90	3.80

1. During the Rearing and Growth bioperiod, the required release will vary based on wet conditions or dry conditions during the previous two weeks. More flow will be released when conditions are wet.
2. Discharges estimated using the USGS StreamStats program available at the USGS website.

7.12 WATER QUALITY AND STORMWATER MANAGEMENT

7.12.1 TREATED WATER QUALITY

The presence of disinfection byproducts (DBPs) is an important consideration in the analysis of this alternative. The two regulated disinfection byproducts are total trihalomethanes (TTHM) and haloacetic acids (HAA5). Because any water transmitted to the University would originate from the Tolland portion of the Western System, the most appropriate point of analysis for CWC is the Robin Circle sample site in Tolland. This site is believed representative of water flowing in and out of the Tolland tank. Table 7.12-1 presents a year of water quality data for this site in comparison to EPA's maximum contaminant levels (MCLs).

Table 7.12-1
TTHM and HAA5 Concentrations at Robin Circle, Tolland

Robin Circle near Tolland Tank, Tolland	TTHM (ppb)	HAA5 (ppb)
July 2011	59.1	26
December 2011	36.9	37
February 2012	31.6	36
April 2012	68.1	24
MCLs	**80**	**60**

ppb = parts per billion

The lack of correlation between highest TTHM and highest HAA5, coupled with the appearance of the lowest levels of HAA5 in the warmer months, indicates that biodegradation of haloacetic acids may be occurring in the Tolland portion of the Western System.

For this alternative, after water leaves the Rockville treatment plant, it would be transmitted to Tolland and either flow directly to the Route 195 pipeline or be stored in the Tolland tank for subsequent flow to the pipeline. TTHM and HAA5 concentrations will increase with age during this time, just as they increase throughout the Western System in locations where groundwater

does not substantially contribute to the system. Water that enters the Tolland tank will experience some degree of stagnation and will be older than water that flows directly to the University. However, the existing water quality data already reflects the influence of the tank. Table 7.12-2 presents a series of questions and conclusions relative to potential DBP levels resulting from use of CWC water under this alternative.

Table 7.12-2
Treated Water Quality Summary Table for CWC

Assessment	TTHM	HAA5
What is the typical concentration near the starting point at the present time?	32-68 ppb	24-37 ppb
Will provision of water to the University and Mansfield cause a decrease in water age in the host system?	Yes	Yes
If so, will the decrease in water age cause an improvement in DBP levels at the starting point?	Yes	Yes
Could biodegradation of the haloacetic acids be occurring in the system?	NA	Yes
Will treated water enter the pipeline with DBP levels less than half the MCLs?	In cooler months	In warmer months
Will the pipeline volume increase the age more than one day?	No	No
Will new storage add significant age?	No	No
Do DBPs exceed their MCLs in the extremities of the host system?	No	No
What is the likelihood that DBPs will be lower than MCLs upon entry to the University system? [high, moderate, low]	Moderate	High
Will blending with the University's water mitigate DBPs?*	Yes	Yes
What is the likelihood that DBPs will be lower than MCLs in the University system?	High	High

**Blending will not occur for replacement of the University's groundwater supplies.*
ppb = parts per billion

As noted above, the use of CWC water at the University will result in the presence of DBPs at higher concentrations in the University distribution system as compared to current levels. The University would need to manage its water supply to ensure DBP compliance with the Stage 1 and Stage 2 of the Disinfection Byproducts Rule. However, there is a high likelihood that DBPs will be lower than the MCLs under this alternative. The small variety in the pipeline lengths will not make a significant difference in the generation of DBPs under the various interconnection scenarios.

7.12.2 SURFACE WATER RESOURCES

This alternative will withdraw water from Shenipsit Reservoir in the Hockanum River basin (#4500). The surface water in the Shenipsit Reservoir is classified as AA, indicating that it is suitable for fish and wildlife habitat, recreation, navigation, existing or proposed drinking water supplies, and industrial and agricultural water supply. The Shenipsit Reservoir is listed as meeting the standard of designated use for aquatic life, drinking water, and fish consumption.

The Connecticut DPH completed a Source Water Assessment Program (SWAP) report for the Shenipsit Reservoir in May 2003. This report noted that while the reservoir has a moderate capacity to support excessive growths of algae and plankton other contaminants are not detected in untreated source water.

The watershed draining to Shenipsit Reservoir includes a significant amount of land in Ellington, small areas of Somers and Stafford, and a significant amount of land in Tolland. The Town of Ellington has designated areas that drain to the Shenipsit Reservoir as the "Shenipsit Watershed Conservation Area" with the long-term goal of promoting low-density residential development in that area. The Town of Tolland has demarcated areas draining to the Shenipsit Reservoir as "Natural Resource" areas with the long-term goal of minimizing environmental impacts from existing and future development. These efforts are aimed at preserving the surface water quality in the reservoir.

The use of the Shenipsit Reservoir to supply potable water to the University and Mansfield is consistent with the surface water designation of that source. Furthermore, the installation of pipelines and other associated construction is not expected to impact water quality.

7.12.3 GROUNDWATER RESOURCES

Groundwater beneath the pipeline routes is primarily mapped as GA or GAA. A few areas of GA-Impaired are mapped in Tolland. The installation of new pipeline is not expected to have an impact on groundwater quality. In fact, the extension of pipelines to Mansfield Four Corners (an area with reduced water quality) is an important benefit relative to public health concerns.

Several wellfields in the CWC Western System have been identified as needing improvements to make this alternative feasible. These wellfields were formerly operated at their diversion rates such that the proposed incremental increase is not expected to reduce water quality in the area or to reduce the water quality in the water flowing to the well. These wells will continue to receive treatment prior to entering the distribution system. In addition, these wells are located relatively far from surrounding residences such that water quality or water quantity impacts to private wells should not be an issue.

7.12.4 STORMWATER MANAGEMENT

Impacts to stormwater quality are not expected as a result of this alternative. Best management practices will be utilized during the construction period such that construction debris and sediment are not directly released to stormwater systems.

New stormwater systems would be developed in concert with any new University development, such as North Campus. New stormwater systems would need to meet University standards. In addition, new stormwater systems would be created during new development projects. The impacts of these systems will be evaluated during local permitting processes.

7.13 FLOOD HAZARD POTENTIAL

The 1% annual chance floodplain has been mapped in the vicinity of potential pipeline segments associated with this alternative. These include the Hockanum River (pipeline segment 8T), the Willimantic River (pipeline segments 12A and 12B), Nelson Brook (pipeline segments 13, 14, and 15), and Cedar Swamp Brook (pipeline segments 14 and 18). The installation of pipelines in

roadways or on the sides of bridges is not expected to result in an increase in flood hazard potential in these areas.

Stream channel encroachment lines (SCELs) are located along the Willimantic River (pipeline segments 12A and 12B). Work within the SCEL boundary is not expected to increase flood hazard elevations.

The redevelopment or replacement of wells at CWC wellfields would need to comply with DPH well siting requirements such as being buffered from the high water mark. CWC has indicated that there is room to redevelop or replace wells at the Powder Hollow, Hunt, and Preston Wellfields while maintaining appropriate siting buffers.

7.14 PHYSICAL ENVIRONMENT

7.14.1 TOPOGRAPHY

The topography of the study area is typical of the eastern highlands in Connecticut, with many hills and ridgelines sloping down into stream and river valleys. The ground elevation of the Rockville WTP at Shenipsit Reservoir is approximately 530 feet. Water in the existing Western System is pumped up to the Tolland tank at a ground elevation of approximately 918 feet. The ground elevation drops to 560 feet near Interstate 84, resulting in the need for pressure-reducing valves in this area.

The proposed interconnection would extend from Interstate 84 up to the vicinity of Anthony Road, climbing to 760 feet in elevation. Elevation quickly drops down the side of Cassidy Hill to the Willimantic River (surface elevation of approximately 320 feet). Potential tank locations have ground elevations of 690 or more feet in Mansfield Four Corners. Potential connection points to the University system are at elevation 700 feet (W-Lot reservoir), 530 feet (16-inch transmission main at Hunting Lodge Road), and 665 feet (16-inch transmission main at North Hillside Road). The varying elevation will require the use of a pumping station in Tolland and at least one pressure-reducing valve to maintain adequate system pressure in Mansfield.

7.14.2 SURFICIAL GEOLOGY

A variety of surficial geology is mapped along potential pipeline routes. The type of soil in a particular area is important for the delineation of wetlands. The types of surficial geology and soils present along potential pipeline routes are not expected to present insurmountable challenges to the completion of this alternative.

7.14.3 BEDROCK GEOLOGY

Fault lines are mapped along potential pipeline segments associated with the CWC alternative; however, they are generally considered to be inactive. The presence of shallow bedrock or ledge is possible along potential pipeline routes that would need to be further explored in the design phase. This alternative will not rely on bedrock well sources. CWC wellfields withdraw water from the stratified drift aquifer.

7.15 AIR QUALITY AND NOISE

The implementation of pumping improvements, treatment plant improvements, new water mains, utility work, and other associated construction will not result in a degradation of air quality.

Minor, temporary construction impacts to air quality are expected and are unavoidable. Overall, these emissions are expected to have a minimal impact on air quality. In addition, other construction activities are expected to generate fugitive dust and mobile source emissions. Such sources of dust are attributed to construction vehicle disturbance during hauling, loading, dumping, and bulldozing. Meteorological conditions, the intensity of the activities, and the soil moisture content govern the extent to which particles will become airborne.

The use of air pollution devices on construction equipment and other forms of controls that reduce the impact from fugitive dust emissions will be utilized during this project to minimize impacts to air quality. The proper phasing of construction will further minimize the length of time that soil remains exposed to wind and water. Activities will be conducted in accordance with proper protocols and regulations, and no washings will be directed to storm drainage.

The implementation of the CWC alternative and associated new water mains and utility work will not result in any long-term noise impacts. New treatment facilities will be located in the vicinity of the existing Rockville WTP with interior equipment that will not create significant noise at the street. New tanks and underground pumping stations also are not significant noise generators. While temporary impacts associated with the construction of new water mains will be realized along state and town roads, the noise generated by these construction activities will largely occur during daylight hours, and impacts will be minimal.

7.16 SOLID WASTE, HAZARDOUS MATERIALS, AND POTENTIAL POLLUTION SOURCES

The presence of solid waste, hazardous materials, and potential pollution sources is particularly important for surface and groundwater supplies. Ongoing water quality monitoring is performed at the existing CWC wellfields to identify the presence of contaminants. These water sources have been consistently monitored and utilized for the past several decades, with acceptable water quality.

Construction of pipeline is not expected to impact existing pollution sources. Water mains are pressurized such that contaminants in the surrounding soil would not be able to enter into the pipe and contaminate the water (except in the case of a main break).

A small amount of construction waste will be generated by the project. Disposal of these wastes will be handled in accordance with applicable solid waste statutes and regulations. Additional impacts to solid waste, hazardous materials, and potential pollution sources will be similar to those for the no action or no-build alternative.

7.17 OTHER PROJECT IMPACTS

7.17.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Certain adverse impacts associated with construction of an interconnection with CWC are unavoidable. These are predominantly in the category of short-term construction-related impacts. The project will undergo a construction phase wherein additional equipment will be utilized. Mitigation measures have been identified with respect to associated short-term air and noise quality. However, a certain degree of additional truck and equipment use and access will be necessary during this time period, which is unavoidable. Potential soil erosion and sedimentation impacts will be largely mitigated through proper construction management techniques. No other unavoidable adverse environmental impacts have been identified.

7.17.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of an interconnection with CWC would utilize nonrenewable resources during the construction and implementation (i.e., construction supplies, fuel, personnel time, etc.). Since these resources cannot be reused, they are considered to be irreversibly and irretrievably committed. Specifically, these include the following actions:

- Clearing
- Installation of water mains to connect to the University and Mansfield
- Installation of associated infrastructure, treatment buildings, etc.

7.17.3 CUMULATIVE IMPACTS

Cumulative impacts are those that result from the incremental impact of the proposed action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts associated with this alternative include the following:

- Additional withdrawals from the Hunt, Preston, and Powder Hollow Wellfields and associated wetland impacts (though believed minimal)
- Additional withdrawals from Shenipsit Reservoir
- Interbasin transfer of water from the Hockanum River basin to the Willimantic and Natchaug River basins
- Formation of DBPs in treated water due to higher water ages along the pipeline
- Additional parallel water mains within roadways under certain transfer rates
- Incremental energy demands
- Incremental traffic density
- Potential for limited secondary growth as a result of the presence of the water main

7.17.4 MITIGATION OPPORTUNITIES TO OFFSET ADVERSE ENVIRONMENTAL IMPACTS

Several mitigation opportunities have been identified for this alternative to minimize or offset adverse environmental impacts. These include the following:

- Continued reliance on the current constant release from the Shenipsit Reservoir to the Hockanum River in the short term, followed by compliance with the Streamflow Regulations in the long term
- Implementation of overlay zones by local land use commissions in Mansfield and potentially Tolland to reduce future development density and creation of impervious surfaces along potential pipeline routes
- Coordination with various local departments, commissions, and committees regarding the proposed pipeline
- Provision of improved fire protection and the construction of fire hydrants
- Designs that hang pipe on bridges or include directional drilling to prevent direct wetland impacts
- Construction occurring in the summer whenever possible to minimize traffic impacts near the University
- Performing a biological survey for endangered, threatened, or special concern species during the design phase to establish buffers and construction timetables to minimize the impact to these species
- Adherence to best management practices to mitigate impacts to stormwater runoff
- Performance of construction activities during daylight hours to minimize noise impacts

7.18 EVALUATION OF PROJECT COSTS

7.18.1 LAND ACQUISITION AND EASEMENT COSTS

The implementation of this alternative may require the purchase or easement of land for pressure-reducing values and a new storage tank in Mansfield Four Corners. The cost for these items could range from minimal (transfer of land from the University for the tank) to approximately $110,000 for a 1.6-acre lot.

7.18.2 COSTS TO IMPROVE EXISTING INFRASTRUCTURE

Source-Related Costs

Costs to restore capacity at the Powder Hollow and Hunt Wellfields are relatively certain. The construction costs for the Powder Hollow improvements have already been tabulated and are approximately $100,000; total anticipated costs will be about $350,000 when testing and appurtenances are included. CWC's estimate for the Hunt Wellfield ranges from $400,000 to $1.2 million. On-site costs associated with a pre-manufactured treatment module of 3.0 mgd are estimated at $6.5 million.

Pumping-Related Costs

Upgrades to the Tolland pumping station are necessary for all the CWC options. CWC has estimated a cost of $250,000 for upgrades.

7.18.3 CONSTRUCTION COSTS

Pipeline and Associated Water Mains

The following assumptions have been incorporated:

- Bends – one located per 1,000 feet of pipeline
- Isolation valves – one located per mile of pipeline
- Flush hydrants – one located per mile of pipeline
- Air release – one located per mile of pipeline
- Fire hydrants – one located per 1,000 feet of pipeline

Table 7.18-1 lists the lowest and highest cost pipelines.

TABLE 7.18-1
Construction Cost Estimates for Potential CWC Pipeline Scenarios

Alternative Pipeline Route	Pipe Diameter	Assumed Capacity	Cost (million)
3A-2	12-inch	2.0 mgd	$7.011
3B-5	12-inch	2.0 mgd	$8.871

Additional pipeline-related costs include the two interconnections with meters (one with Tolland and one with the University system) and the pressure-reducing stations that are necessary along Route 195, as presented in Table 7.18-2.

TABLE 7.18-2
Construction Costs Utilizing Lowest-Cost CWC Pipeline Scenario and Related Infrastructure

Component	Cost
Pipeline	$7,011,000
Interconnection and Meter	$400,000
Pressure-Reducing Vault	$550,000

7.18.4 ANALYSIS OF PROBABLE CAPITAL COSTS

The costs described above are summarized in Table 7.18-3.

TABLE 7.18-3
Summary of Estimated Costs for Alternative #3

Component	*Cost*
Powder Hollow Wells	$350,000
Hunt Wells	$1,200,000
Package WTP at Rockville	$6,500,000
Upgrade of existing Tolland Pump Station	$250,000
Pipeline	$7,011,000
Interconnection/Meter	$400,000
PRVs	$550,000
Design/contingency (20% of above)	$3,52,200
Permits and Approvals	$400,000
Legal agreements and services	$200,000
Total	**$20,113,200**
Normalized Cost per MGD	***$10,056,600***

Most of the mitigation opportunities listed in Section 7.17.4 will have costs that are inherently incorporated into components of the alternative. For example, coordination with local departments and commissions regarding the pipeline are typically incorporated into design and regulatory costs, as are designs that hang pipe on bridges or include directional drilling to prevent direct wetland impacts, and construction in the summer whenever possible to minimize traffic impacts near the University. Thus, much of the mitigation does not have a separable cost. On the other hand, implementation of overlay zones by local land use commissions in Mansfield and potentially Tolland will have a moderate cost to each community, on the order of $10,000 for each.

Continued reliance on the constant release from the Shenipsit Reservoir to the Hockanum River in the short term, followed by compliance with the Streamflow Regulations in the long term, are required regardless of the action selected in this EIE. Therefore, these costs are not applicable.

7.19 FINDING

Interconnection with CWC is a feasible alternative that will not result in significant environmental impact. This alternative has the ability to meet the project purpose and need to provide a safe, reliable water supply source that maximizes benefits while minimizing environmental, land use, and other adverse impacts. This alternative has the ability to provide additional water supply to the University that will maintain a long-term system MOS greater than 1.15 while meeting committed demands. Additionally, it has the ability to provide additional water supply to support future growth at the University and in the town of Mansfield.