

12.0 SELECTION OF PREFERRED ALTERNATIVE

12.1 ABILITY TO MEET PROJECT NEED

Alternatives were evaluated in Sections 5 through 11 of this document. Feasible alternatives must be able to:

1. Supply a safe and reliable supply of potable water in the amount of 1.23 million gallons per day (mgd) during average day demand (ADD) conditions.
2. Supply a safe and reliable supply of potable water in the amount of 1.93 mgd during peak day demand (PDD) conditions.
3. Have the ability to expand to accommodate additional future potential on-campus growth.

Table 12.1-1 summarizes the capability of each alternative to meet the project purpose and need.

**TABLE 12.1-1
Ability of Each Alternative to Meet Project Need**

<i>Alt. #</i>	<i>Alternative Name</i>	<i>Able to Deliver ADD of 1.23 mgd?</i>	<i>Able to Deliver PDD of 1.93 mgd?</i>	<i>Able to Expand to Accommodate Additional Future Growth?</i>
#1	No Action	No	No	No
#2	Replacement of Fenton Well A	No	No	No
#3	Interconnection with CWC	Yes	Yes	Yes
#4	Interconnection with MDC	Yes	Yes	Yes
#5	Interconnection with WWW	Yes	Yes	Yes
#6	Development of New Groundwater Supply along Willimantic River	No	No	No
#7	Development of New Groundwater Supply Near Mansfield Hollow Lake	No	No	No

CWC = Connecticut Water Company
MDC = Metropolitan District Commission
WWW = Windham Water Works

Alternatives 3, 4, and 5 (interconnection with Connecticut Water Company, the Metropolitan District Commission, and Windham Water Works, respectively) are able to meet the project purpose need. The manner in which this can be accomplished is as follows:

- Connecticut Water Company (CWC) would draw upon the Shenipsit Reservoir while utilizing groundwater supply wells at Powder Hollow, Hunt, Preston, and other Northern Region wells within their existing registered withdrawal rates. System improvements include return of the Preston Wellfield to active use; recovery of registered capacity from the Powder Hollow and Hunt Wellfields; and expansion of the Rockville Water Treatment Plant (WTP). Piping extension would be required from the terminus of CWC's system in Tolland through a short distance in the Town of Coventry, and into Mansfield.

- The Metropolitan District Commission (MDC) would draw upon the Barkhamsted and Nepaug Reservoirs in the Farmington River basin within their existing registered withdrawal rates. Piping extension would be required from the terminus of MDC's system in East Hartford via one of two contemplated routes. Route #4A runs through portions of Manchester, Bolton and Coventry and then into Mansfield. Route #4B runs through portions of Manchester, South Windsor, Vernon, Tolland, and Coventry before entering Mansfield.
- Windham Water Works (WWW) would draw from the Willimantic Reservoir upstream of the lower reach of the Natchaug River. In order to reliably provide the University and the Town of Mansfield with additional water supply while maintaining an adequate margin of safety (MOS), WWW would require a new or modified diversion permit and a treatment plant expansion. Additionally, WWW has indicated that removal of sediment from the Willimantic Reservoir would be required by its Water Commission if this alternative were pursued.

12.2 ENVIRONMENTAL IMPACTS

A summary of potential impacts is provided below for the feasible alternatives.

12.2.1 LAND USE

Table 12.2-1 summarizes state-designated land uses and current zoning by town for the interconnection pipeline routes. The *Conservation and Development Policies Plan* for Connecticut (the State Plan) discourages provision of public water supply in areas designated as existing preserved open space, preservation areas, conservation areas, rural lands, aquifer protection areas, and historic areas.

The intended developments for which a new source of supply is being sought are all located within the Town of Mansfield in areas where such development is consistent with State Plan designations. These developments are also consistent with local zoning regulations and the Town of Mansfield's *Plan of Conservation and Development*. Under all feasible alternatives, transmission pipeline will be laid through areas in town that pass through State Plan-designated areas that are not intended for public water supply service (Refer to Figure 4.1-1). In order to address this discrepancy, the Town of Mansfield is undergoing a comprehensive and detailed revision of its regulations and has proposed overlay zones to restrict development in areas of public water supply such that local development is consistent with the State Plan. The proposed overlay zones will restrict development along potential pipeline routes within the Town of Mansfield where intense development would be inconsistent with the State Plan, local zoning designations, and/or Mansfield's *Plan of Conservation and Development*. In this manner, unwanted or unanticipated secondary growth can be avoided.

Secondary growth in the Towns of Tolland, Coventry, and Bolton could be affected by various pipeline routes associated with the interconnection alternatives. These are discussed below.

**TABLE 12.2-1
State Plan Designations, Zoning, and Summary of Recommended Mitigation per Town**

Town Name	Interstate or Roadway	Alternatives Considered ¹	Adjacent Zoning Districts	State Plan Designations ²						Existing PWS?	Mitigation			
				RC	NC	GA	RCC	EPOS	PA			CA	RL	
Mansfield	Route 195 (northwest)	CWC, MDC	Neighborhood Business Zone 1							X		No	Overlay Zone	
			Rural Agricultural Residence 90					X	X	X	X	No	Overlay Zone	
			Professional Office 1							X	X	No	Overlay Zone	
			Residence 90							X	X	No	Overlay Zone	
			Planned Business 3			X						No	Overlay Zone	
	Baxter Road/Route 44	CWC, MDC	Rural Agricultural Residence 90					X	X	X	X	No	Overlay Zone	
			Planned Business 3			X						No	Overlay Zone	
	Route 44	MDC	Neighborhood Business Zone 1							X		No	None	
			Rural Agricultural Residence 90		X	X		X	X	X	X	Partial	Overlay Zone	
			Institutional		X							Partial	None	
Chaffeeville Road	WWW	Rural Agricultural Residence 90					X	X	X		No	Overlay Zone		
Clover Mill/Maple Road	WWW	Rural Agricultural Residence 90					X	X	X	X	No	Overlay Zone		
Coventry	Route 195	CWC, MDC	Neighborhood Commercial							X		No	None	
			River/Aquifer Zone						X	X		No	None	
	Route 44	MDC	Commercial				X			X	X	X	No	Possible Overlay Zone
			Professional Office							X	X		No	Possible Overlay Zone
			Commercial/Agricultural						X	X	X		No	Possible Overlay Zone
			General Residential Zone 80				X	X	X	X	X		No	Possible Overlay Zone
			General Residential Zone 40						X	X	X		No	Possible Overlay Zone
			River/Aquifer Zone						X	X			No	Possible Overlay Zone
Tolland	I-84	MDC	Commercial/Industrial			X		X				Yes	None	
			Tolland Business Park			X		X				Yes	None	
			Residential Design District					X	X	X	X	No	Possible Overlay Zone	
			RDD-Nat. Resource & Wildlife					X	X	X	X	No	Possible Overlay Zone	
			Tolland Village Area				X					Yes	None	
			Gateway Design District				X					Yes	None	
	Route 195	CWC, MDC	Gateway Design District				X					Yes	None	
			Neighborhood Commercial				X					Yes	Possible Overlay Zone	
			Residential Design District						X	X	X	No	Possible Overlay Zone	
			RDD-Nat. Resource & Wildlife						X	X	X	No	Possible Overlay Zone	
Bolton	I-384	MDC	Residential 1						X	X	X	No	Possible Reg. Amendment	
			Residential 2							X		No	None	
			Industrial							X		No	None	
			General Business							X		No	None	
	Route 44	MDC	Residential 1							X	X	X	No	None
			Residential 2								X		No	None
			Residential 3							X	X	X	No	None
			Industrial								X		No	None
			General Business							X	X	X	No	None
											X	X	No	None
Vernon	I-84	MDC	Commercial		X	X			X	X		Partial	None	
			Single-Family Residential R-27		X	X		X	X	X	X	Partial	None	
			Planned Residential Development		X							Yes	None	
			Special Economic Development		X	X						Partial	None	
			Industrial			X			X	X		Yes	None	
			Planned Development - Exit 67		X	X			X	X		Yes	None	
Manchester	I-84	MDC	Rural Residence		X				X			Yes	None	
			Residence B		X							Yes	None	
			Industrial		X				X			Yes	None	
			Planned Residential Development		X				X			Yes	None	
			General Business		X				X			Yes	None	
			Comprehensive Urban Develop.		X							Yes	None	
			Business 5		X							Yes	None	
			Residence A		X							Yes	None	
			Special Design Commercial		X							Yes	None	
			Industrial		X	X						Yes	None	
				Rural Residence		X	X		X		X		Partial	None
				General Business		X							Yes	None
				Elderly Housing Development		X							Yes	None
				Business 1	X	X							Yes	None
				Business 2	X	X							Yes	None
				Residence AA	X	X			X				Yes	None
				Residence A	X	X							Yes	None
				Residence B	X	X							Yes	None
				Residence C	X	X							Yes	None
				Planned Residential Development	X	X							Yes	None
Historic	X								Yes	None				
South Windsor	I-84	MDC	Industrial		X						Yes	None		

Notes
1. CWC = The Connecticut Water Company
MDC = The Metropolitan District
WWW = Windham Water Works

2. State Plan Designations:
RC Regional Center
NC Neighborhood Conservation
GA Growth Area
RCC Rural Community Center
EPOS Existing Preserved Open Space
PA Preservation Area
CA Conservation Area
RL Rural Lands

Alternative 3 – CWC Interconnection

The CWC system in Tolland has a terminus on Route 195 on the north side of Interstate 84. Under this alternative, water mains would be installed beneath existing roads in Tolland, Coventry, and Mansfield to interconnect the CWC water system with the University's system. Existing and potential future land uses as well as the potential for secondary development have been evaluated for this alternative. Potential land use impacts in Tolland and Coventry are described below.

Land Uses in Tolland

Approximately 1.6 miles of pipeline would traverse Route 195 in the town of Tolland in areas that do not currently have access to public water supply (Refer to Figure 3.4-1). Public water service is currently available through the town of Tolland on Anthony Road and the portion of Route 195 northwest of Anthony Road. Therefore, risk for induced development in this area as a result of a future CWC supply to the University and Mansfield is low. Public water service is not currently available in the Residential Design District (RDD) and RDD-Natural Resource and Wildlife Protection Area district 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 multi-family/moderate-density residential on this parcel is consistent with Tolland's future land use plan in its *Plan of Conservation and Development*.
- The large parcel between Norwegian Woods and Dimock Road is preserved as open space and is therefore unlikely to be developed.
- Many small parcels with existing single family homes are located 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 are located on the eastern side of Cassidy Hill and support many wetlands and Clark Brook, thus developable land is limited. The "Future Land Use Plan" in Tolland's *Plan of Conservation and Development* denotes this area as "low-density residential."

If public water is made available along Route 195 in Tolland, additional development could occur. However, given the limited amount of potentially developable land area, secondary growth impacts, if they occur, are not anticipated to be significant.

Land Use in Coventry

Route 195 traverses a small portion of the Town of Coventry, approximately one-quarter mile in length (Refer to Figure 3.4-2). The road passes through a State-designated Conservation Area

with a small adjacent Preservation Area (Refer to Figure 4.1-4). Ideally, local zoning designations should support the intended density and character of development reflected in the State Plan. When local zoning is not consistent, a departure in the type and density of development can occur. The Coventry *Plan of Conservation and Development* and zoning map are in conflict with both the State Plan and the Windham Council of Governments (WinCOG) Land Use Plan where Route 195 traverses the town.

Parcels located in the area of the CWC pipeline segment along Route 195 (11 and 12A) and on Jones Crossing Road (12B) in Coventry 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 a more intense land use. The recent rezone to Neighborhood Commercial would allow a hotel, a use that the town is believed to support.
- The large parcel associated 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 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.
- 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. It is located in a General Residential Zone (GR-80), which is low density residential zone. A variety of residential uses would be allowable through Special Permit.

None of the above parcels have public sewer service. If public water is made available along Route 195 in Coventry, additional development could occur. However, this is a small land area and secondary growth impacts, if they occur, are anticipated to be limited.

Alternative 4 – MDC Interconnection

The Metropolitan District Commission (MDC) public water system in East Hartford could be extended through various pipeline routing alternatives to supply the University and the Town of Mansfield (Refer to Figure 3.5-2). An interconnection with MDC has the potential to affect land uses in the towns through which the potential pipeline routes occur.

Two pipeline routes are possible to provide water from MDC's system in East Hartford. The first would run from East Hartford, through Manchester, Bolton, and Coventry to Mansfield (Routing #4A). Land areas in East Hartford and Manchester are currently served by public water along the affected pipeline segments such that impacts to land use are not expected. Potential impacts to Bolton and Coventry are described below.

Land Uses in Bolton

Potential pipeline routing through Bolton runs along Interstate 384 for approximately 1.6 miles and then along Route 44 for another 1.6 miles (Refer to Figure 3.5-2). The majority of land along the I-384 corridor is zoned residential. Single-family residential development already covers much of these areas, but a few large undeveloped parcels are present, especially between the Manchester town line and Route 85. Bolton's *Plan of Conservation and Development* clearly calls for the rural residential character of the town to remain intact in areas that are not located along Route 44 and Route 6.

From its junction with Interstate 384 and eastward, Route 44 passes through State-designated Rural Lands and Conservation Areas, with some adjacent Preservation Areas and Existing Preserved Open Space (Refer to Figure 4.1-1).

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

The presence of the water main is expected to enable the Town of Bolton to encourage specific types of mixed-use, commercial, and industrial developments along Route 44. In addition to commercial development, it is possible that several hundred residential parcels could develop in new mixed-use or residential developments along Route 44. Along Interstate 384, several large parcels zoned as R-1 and R-2 are located adjacent to the State right-of-way along the pipeline route such that these areas could be served by a water main even with access to these areas occurring from a road other than the highway. Potential residential development adjacent to Interstate 384 could increase local population up to 500 people if parcels were fully developed, with additional population increases realized via potential residential and mixed-use developments along Route 44.

Land Uses in Coventry

Route 44 passes through mainly state-designated Rural Lands and Conservation Areas in the Town of Coventry. The intersection of Route 44 with Main Street/Grant Hill Road is surrounded by a small area designated as a Rural Community Center. Very small Preservation Area designations cross Route 44 along watercourses. One Existing Preserved Open Space designation is located on the north side of Route 44 between North River Road and Carpenter Road; this is the Manchester Coon and Fox Club land.

Although Rural Lands and Conservation Areas comprise most of the corridor, a subtle distinction can be made between lands west of the Rural Community Center and lands to the east. West of the Rural Community Center, a higher percentage of the land is designated as Conservation Area. East of the Rural Community Center, a higher percentage of the land is designated as Rural Lands. However, for the purpose of evaluating future development as a result of public water supply, all three designations (Rural, Rural Community Center, and Conservation) are addressed in the same manner. State policy is to avoid extension of water systems in these areas.

While installation of water *transmission* piping through conservation areas is not necessarily at odds with the State Plan, water service off such a line is not consistent with the Plan designations in Coventry along the entire 5.4 mile pipeline corridor. The pipeline under MDC routing scenario #4A passes residentially-developable parcels that if fully developed could increase the population of Coventry by approximately 400 people.

The second MDC interconnection pipeline route would run from East Hartford, through Manchester, a very short segment in South Windsor, Vernon, Tolland, and Coventry to Mansfield (Routing #4B). East Hartford, Manchester, South Windsor and Vernon are currently served by public water along the affected pipeline segment such that impacts to land use are not expected. Potential impacts for Tolland adjacent to Interstate 84 are described below.

Land Uses in Tolland

Routing scenario #4B crosses a similar area of Tolland as the CWC alternative described above for areas south of Interstate 84 on Route 195. This analysis realized relatively minimal impacts to land use and potential for secondary development from a potential pipeline through the area. Areas located adjacent to Interstate 84 must also be considered under the MDC alternative. These include:

- Five undeveloped or partially-developed parcels north of Loehr Road on the south side of Interstate 84 total 17.4 acres. These parcels could potentially be developed into single family homes.
- A 29.4-acre parcel located north of Interstate 84 west of an impoundment of Chapin Meadow Brook caused by the highway. The Tolland *Plan of Conservation and Development* identifies most of the developable area of this parcel as a medium open space priority.
- Three undeveloped or partially-developed parcels (totaling 55.2 acres) north of Metcalf Road and west of Cider Mill Road on the south side of Interstate 84.

If development occurred on these parcels in response to the availability of public water, population could increase by several hundred in Tolland.

Summary

The potential for provision of water supply in areas that would be inconsistent with the State Plan is much greater for MDC routing scenario #4A. Routing scenario #4A traverses more than three miles through rural Bolton and over five miles within the Town of Coventry that are currently designated as Rural, Preservation, and Conservation lands. Routing scenario #4B would occur along Interstate 84 in Tolland, thus somewhat more remote from adjacent, potentially developable residential land and with fewer conflicts with the State Plan.

Alternative 5 – WWW Interconnection

Transmission mains under the WWW interconnection alternative will be limited to areas within the Town of Mansfield. As indicated above, 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. In this manner, unwanted or unanticipated secondary growth can be avoided. As such, conflicts with the State Plan are believed to be resolved.

12.2.2 WATER RESOURCES

Impacts to source waters will vary depending on the selected alternative:

- Provision of water from CWC would draw upon the Shenipsit Reservoir while the Powder Hollow, Hunt, Preston, and other Northern Region wells will offset some of the treated water from Shenipsit that is distributed to the west and north. While system improvements are proposed, no new sources would be developed under this alternative and withdrawal rates would largely not exceed historic withdrawals. Reservoir withdrawals would be mitigated, as they are today, 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.
- Provision of water from MDC would draw upon the Barkhamsted and Nepaug Reservoirs in the Farmington River basin. Withdrawals would not exceed existing registered rates, and source and treatment plant improvements are not proposed. MDC is not required to release water under Connecticut's streamflow regulations; however, MDC will continue to manage releases from the West Branch Farmington River reservoirs.
- Provision of water from WWW would draw upon the Willimantic Reservoir upstream of the Natchaug River. A new or modified diversion permit would be needed as well as removal of sediment from the reservoir to maintain adequate water quality. WWW operates its source of supply as a run-of-the-river withdrawal rather than relying on reservoir storage. Mitigation could take the form of increasing releases from Mansfield Hollow Lake by the U.S. Army Corps of Engineers, although this is beyond the control of the University, Town of Mansfield, or WWW.

No direct impacts are expected to occur to surface water or groundwater as a result the installation of water mains and pipelines. The integrity of bridges and culverts will not be compromised, as water mains will be primarily installed using directional drilling or attached to bridges.

12.2.3 SOCIOECONOMICS

The provision of additional water supply to the University and Town of Mansfield is expected to have a positive impact on the local and regional socioeconomic horizon through creation of direct new employment on campus as well as indirect and induced job creation off campus. The Town of Mansfield and its neighboring communities are well positioned to absorb any incremental increase in population and housing demand resulting from new water supply, even with the land use controls that will be enacted to limit development along the pipeline route in Mansfield.

12.2.4 COMMUNITY FACILITIES AND SERVICES

The provision of additional water supply to the University and Town of Mansfield is consistent with current community services. The burden on municipal and University emergency services personnel is not expected to increase significantly.

12.2.5 AESTHETIC AND VISUAL RESOURCES

The provision of additional water supply to the University and Mansfield will enable additional development on-campus as well as in portions of northern Mansfield in areas proximate to the University's Main and Depot campuses and Agronomy Farm. On-campus development will be congruent with the architecture and building heights throughout the campus. Any off-campus development within the Town of Mansfield will be guided by local regulations relative to aesthetics and will require approval through Mansfield's Planning & Zoning Commission. Additionally, the aesthetics of pumping stations and storage tanks will need to be sited and designed such that they are congruent with the aesthetic character of the surrounding area.

12.2.6 PUBLIC UTILITIES AND SERVICES

The provision of additional water supply to the University and Town of Mansfield will increase the capacity of the University's water system. Benefits to small community, non-transient non-community, and transient non-community water systems will be realized through interconnections or direct connection to new pipelines. However, the furtherance of duplicative water service in the State (specifically in Manchester, South Windsor, Vernon, and Tolland for the MDC interconnection) is contrary to the State's statutory obligation for coordinated water supply planning. The same issue is not problematic where CWC would utilize a section of the water main owned by the Town of Tolland.

Significant adverse impacts to storm sewer, electric, gas, telephone, and cable services are not anticipated.

12.2.7 CULTURAL RESOURCES

Where pipeline is installed outside of previously disturbed public rights-of-way, sensitivity to historic or archeological resources is possible along pipeline routes in Mansfield, Tolland, Coventry, and Bolton. In such instances, site-specific investigations will be undertaken in consultation with state and local entities such that impacts to cultural resources are avoided or minimized to acceptable levels.

12.2.8 TRAFFIC, TRANSPORTATION AND PARKING

The provision of additional water supply to the University and Town of Mansfield will cause temporary impacts to traffic, as water mains will be installed in state and town roadways. No permanent impacts to traffic will occur. Individual development that occurs as a result of the availability of a source of public water supply will require site-specific review through local approval processes and, where applicable, through the Connecticut Office of State Traffic Administration (OSTA).

12.2.9 FLOOD HAZARD POTENTIAL

Installation of pipelines will have minimal impacts where they cross special flood hazard areas (SFHAs), as piping and appurtenances will be below grade.

12.2.10 BIOLOGICAL ENVIRONMENT

The majority of pipeline installation will occur where roads are currently paved and therefore do not support significant biological communities. Best practices will be undertaken to minimize disturbances to adjacent biological resources. Protection of fishery resources and fish habitats will be of paramount importance for all of the alternatives.

For the WWW alternative, increased withdrawals from the Willimantic Reservoir may adversely affect riffle and run habitats downstream of the reservoir in the Natchaug River. Removal of sediment from the Willimantic Reservoir will likely impact some wetland vegetation, although the extent and length of such impact can only be evaluated following a specific proposal for excavation. Based upon similar projects undertaken at other Connecticut Reservoirs, sediment excavation can be achieved without unacceptable impacts to wetlands or fisheries.

12.2.11 PHYSICAL ENVIRONMENT

No significant changes will occur to the physical environment as a result of provision of water to the University and Mansfield. Significant modifications to area topography are not contemplated.

12.2.12 AIR QUALITY

The provision of additional water supply to the University and Town of Mansfield will not significantly impact air quality in the Town of Mansfield or the region. Numerous controls are proposed for minimizing short-term construction related impacts to air quality from fugitive dust and other pollutant emissions.

12.2.13 NOISE QUALITY

Minor temporary noise impacts are anticipated during construction of the water pipeline. The majority of construction activities will occur in the daylight hours to minimize noise impacts. New pumping stations for the CWC, MDC, and WWW alternatives will become localized sources of noise, although such noise will be minimal.

12.2.14 SOLID WASTE AND HAZARDOUS WASTE MATERIALS

Other than temporary construction and demolition-related impacts, minimal impacts related to solid waste and hazardous materials are expected as a result of provision of water to the University and Mansfield.

12.2.15 ENERGY RESOURCES

Increases in energy usage would occur for all of the feasible alternatives. For the CWC interconnection alternative, energy will be used to withdraw additional groundwater from wells in the Western System, filter and treat additional water at the Rockville WTP, and pump water through the pipeline. For the MDC interconnection alternative, energy will be used to filter and treat additional water at the West Hartford and Bloomfield WTPs and to pump water through a series of pumping stations along the pipeline. For the WWW alternative, energy will be used to filter and treat additional water at the WTP and pump water through the pipeline.

Systems that are more proximal and at higher elevations (CWC and WWW) will use less energy than systems that are distant and at lower elevations (MDC). The periods of peak water demand at the University (late August and early September), and hence peak electrical demand for pumping and treating, does not typically coincide with peak Statewide electrical demand (typically July). Energy usage will also increase where additional water allows development; however, these are not anticipated to be regionally significant.

12.2.16 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 the feasible alternatives include the following:

- Additional groundwater and/or surface water supply withdrawals;
- Interbasin transfers of water;
- Formation of additional disinfection byproducts in treated water due to higher water ages along pipelines;
- Additional water mains within roadways;
- Incremental energy demands; and
- Additional development due to expansion of public water systems.

Cumulative impacts are most likely for the alternatives that cause further diminution of flows in nearby watercourses, such as the WWW interconnection. On the other hand, CWC and MDC have a greater ability to actively mitigate for diminution of flows below their reservoirs, and the cumulative impacts will be minimized.

12.2.17 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Certain adverse impacts associated with provision of water to the University and Mansfield are unavoidable. Delivery of water to the University and Mansfield from CWC, MDC, or WWW will constitute an interbasin transfer of water and resulting loss of water from local donor basins; this cannot be avoided. The CWC and MDC alternatives would involve transfers of water from the Connecticut River major basin whereas the WWW alternative would involve the transfer of water within the Thames River major basin. CWC and MDC are capable of managing releases to downstream watercourses. WWW does not have such capabilities because it operates a run-of-the-river dam.

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.

Unavoidable adverse environmental impacts are possible along some of the pipelines, especially in the rural communities of Tolland, Bolton, Coventry, and Mansfield. These unavoidable adverse impacts could be mitigated by local land use regulations and zoning, with the Town of Mansfield considered most equipped and well-positioned to directly address the risks for development along pipelines. By virtue of the shorter potential pipelines, the CWC and WWC alternatives present a lesser degree of risk than the MDC alternative.

No other unavoidable adverse environmental impacts have been identified.

12.2.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The construction of any of the interconnection alternatives will 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;
- Access road construction;
- Installation of water mains to connect to the University and Mansfield; and
- Installation of associated infrastructure, treatment plant expansions, etc.

12.3 OPPORTUNITIES FOR MITIGATION

Mitigation measures have been identified throughout this document. Table 12.3-1 provides a summary of mitigation opportunities. Additional discussion follows.

**TABLE 12.3-1
Opportunities for Mitigation**

Mitigation Opportunities	Alternative		
	3	4	5
	CWC	MDC	WWW
Actively manage releases to rivers located downstream of reservoirs	Yes	Yes	No
Implementation of overlay zones to reduce future development densities	Yes	Yes	Yes
Coordination with various local departments, commissions, and committees regarding proposed pipelines	Yes	Yes	Yes
Pipeline designs that hang pipe on bridges or include directional drilling to prevent direct wetland impacts	Yes	Yes	Yes
Construction occurring in the summer whenever possible to minimize traffic impacts near the University	Yes	Yes	Yes
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	Yes	Yes	Yes
Adherence to best management practices to mitigate impacts to stormwater runoff	Yes	Yes	Yes
Performance of construction activities during daylight hours to minimize noise impacts	Yes	Yes	Yes
Reduction of water age, mixing in tanks, and blending with groundwater (the University's or otherwise) to reduce DBPs	Yes	Yes	Yes
Provide benefits such as emergency interconnections with other water utilities where pipelines are contrary to exclusive service areas	No	Yes	No
Provide emergency interconnection with Tolland's municipal water system	Yes	Yes	No

12.3.1 SECONDARY GROWTH MITIGATION

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.

Secondary growth mitigation is possible in other communities where potential pipeline routes traverse land that, were it developed as a direct result of the availability of public water supply, would be contrary to the State Plan, local planning and zoning designations, or local plans of conservation and development. This is the case in Tolland, Coventry, and Bolton; however, those communities have not committed to such protections at this time. In the case of Coventry and Bolton, discrepancies exist between the community's local vision and the State Plan such that mitigation through development protections may not have local support.

12.3.2 FISHERIES IMPACT MITIGATION

Under the CWC interconnection alternative, Shenipsit Reservoir withdrawals would be mitigated, as they are today, 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. For the MDC interconnection alternative, MDC is not required to release water under Connecticut's streamflow regulations; however, MDC will continue to manage releases from the West Branch Farmington River reservoirs in accordance with various agreements. Under the WWW interconnection alternative, mitigation could take the form of additional releases from Mansfield Hollow Lake by the U.S. Army Corps of Engineers, although this is beyond the control of the University, Town of Mansfield, or WWW. Overall, CWC and MDC have a greater ability to actively mitigate for diminution of flows below their reservoirs.

12.3.3 AIR POLLUTION MITIGATION

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.

Primary short-term air quality concerns relate to construction activities and their potential to generate fugitive dust and mobile source emissions. Such sources of dust are attributed to construction vehicle disturbance during hauling, loading, dumping, excavation, and bulldozing on any areas of the proposed development. Meteorological conditions and the intensity of the activities as well as soil moisture content also govern the extent to which particles will become airborne.

Various methods of controlling fugitive dust include the use of water or wetting agents on exposed soil and gravel areas, periodic sweeping and daily rinsing of truck tires, and proper maintenance of portable generators, on-site machinery, and vehicles. Additionally, the following best management practices will be incorporated as appropriate in the construction phase of this project:

- Minimization of exposed erodible earth area
- Stabilization of exposed earth with grass, pavement, or other cover as early as possible
- Application of a stabilizing agent to the work areas and haul roads
- Covering, shielding, or stabilizing stockpiled material as necessary
- Use of covered haul trucks
- Rinsing construction equipment during the incidental transport of soil from unpaved to paved surfaces to minimize drag-out

Even well-maintained trucks and other construction equipment typically emit small amounts of pollutants such as nitrogen oxides, sulfur oxides, and carbon monoxide related to internal combustion or diesel engines. Proper maintenance of portable generators, on-site machinery, and vehicles is, thus, important to reduce the potential for higher smoke emissions associated with improperly operating equipment. Contractors will be responsible for maintaining all construction equipment and will be required to comply with the university's *Environmental, Health, and Safety Policies, Regulations, and Rules for Construction, Service, and Maintenance Contractors* manual dated February 18, 2010.

Off-site tracking occurs when residual soil particles are displaced from construction sites onto higher traffic roadways and then become both airborne and waterborne. These measures will also control dust from exposed soil or gravel areas to further minimize airborne particulate matter.

12.4 CERTIFICATES, PERMITS AND APPROVALS

The proposed project will be subject to environmental certificates, permits, and approvals listed in Table 12.4-1 below. Additional permits or approvals may be identified by review agencies during the design process.

**TABLE 12.4-1
List of Potentially Required Construction Permits**

Permit/Approval	Reviewing Authority
Water Diversion Permit	CT DEEP
401 Water Quality Certificate	CT DEEP
Flood Management Certification	CT DEEP
Inland Wetlands Permit	CT DEEP
Stormwater Permit	CT DEEP
Construction Dewatering Permit	CT DEEP
Hydrostatic Discharge Pressure Testing Wastewater Permit	CT DEEP
Section 404 Permit	USACE
Encroachment Permits	CT DOT
Railroad crossing permit	RailAmerica, Inc.
Pumping stations	Connecticut DPH
Storage tanks	Connecticut DPH
Treatment plant improvements	Connecticut DPH
Sale of Excess Water Permits	Connecticut DPH
Water main extensions	Connecticut DPH
Building Permits for Pumping Stations	Various Municipalities
Town Road Work Permits	Various Municipalities

12.5 SCHEDULE

Table 12.5-1 presents an anticipated timeline for the feasible alternatives. Overall project durations are as follows:

- CWC Interconnection.....3 years
- MDC Interconnection.....4.5 years
- WWW Interconnection.....3 years

To provide for a uniform schedule for each feasible alternative, differences in pipeline routing scenarios have not been taken into account. For each alternative, the assumption is that the least-cost scenario has been selected. Furthermore, all of the pipeline costs include five months of shut-down for the period of November through March when paving is suspended. The longest construction schedule (70 weeks for an MDC pipeline) includes two five-month shut-downs, whereas the CWC and WWW pipelines include one five-month shut-down.

TABLE 12.4-1
TIMELINE FOR EACH ALTERNATIVE

CWC	Status	Month of First Year												Month of Second Year												Month of Third Year												
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Source-Related Improvements																																						
Powder Hollow Wells																																						
Design and Permits/Approvals	Complete																																					
Construction	Will be complete by 2013																																					
Hunt Wells																																						
Design and Permits/Approvals																																						
Construction																																						
Pre-manufactured WTP at Rockville																																						
Design and Permits/Approvals																																						
Construction																																						
Pumping-Related Improvements																																						
Upgrade of existing																																						
Design and Permits/Approvals																																						
Construction																																						
Pipeline-Related Construction																																						
Pipelines																																						
Interconnection/meter																																						
PRVs																																						
Design and Permits/Approvals																																						
Construction*																																						
Other Permits and Mitigation																																						
Water Diversion Permit																																						
Sale of Excess Water Permit																																						
Mansfield Land Use Regs/Zoning	Commenced 9/2012																																					
Tolland Land Use Regs/Zoning																																						

MDC	Status	Month of First Year												Month of Second Year												Month of Third Year												Month of Fifth Year											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Pipeline-Related Construction																																																	
New pumping stations																																																	
Pipelines																																																	
Interconnection/meter																																																	
PRV																																																	
Design and Permits/Approvals																																																	
Construction*																																																	
Permitting/Mitigation Costs																																																	
Water Diversion Permit																																																	
Sale of Excess Water Permit																																																	
Mansfield Land Use Regs/Zoning	Commenced 9/2012																																																
Land Use Regs/Zoning (other towns)																																																	

WWW	Status	Month of First Year												Month of Second Year												Month of Third Year												
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Source-Related Improvements																																						
WTP Expansion																																						
Design and Permits/Approvals																																						
Construction																																						
Dredging of Willimantic Reservoir																																						
Design and Permits/Approvals																																						
Construction																																						
Storage-Related Improvements																																						
Tank																																						
Design and Permits/Approvals																																						
Construction																																						
Pumping-Related Improvements																																						
New pumping station																																						
Design and Permits/Approvals																																						
Construction																																						
Pipeline-Related Construction																																						
Pipelines																																						
Interconnection/meter																																						
Design and Permits/Approvals																																						
Construction*																																						
Permitting/Mitigation Costs																																						
Revise Instream Flow Study																																						
Water Diversion Permit																																						
Sale of Excess Water Permit																																						
Mansfield Land Use Regs/Zoning	Commenced 9/2012																																					

*Total duration assumes a loss of five months for winter paving shutdown (November through March)

The Town of Mansfield has already begun the process of modifying land use regulations and zoning. Although the Town's broader planning effort will continue through 2015, the land use regulation revisions and overlay zoning will likely be in place by 2014. As such, all of the timelines depict a 12-month schedule "remaining" for the land use mitigation in Mansfield. This is consistent with an EIE approval by OPM in 2013.

Additional assumptions and discussion are provided below.

CWC Interconnection

A 36-month schedule is estimated. Important assumptions include:

- Improvements to the Powder Hollow Wellfield will have been completed before the timeline begins, as these improvements are currently underway.
- Design and permitting/approvals would commence immediately for the Hunt Wellfield improvements, Rockville WTP, and the pipeline with related improvements to pumping and pressure reduction. The approvals included in this timing may include the following from DPH: well site approval for the Hunt Wellfield improvements, treatment plant approval for the Rockville WTP package plant, water main approval for the pipeline, and pumping station approval for the Tolland pumping station upgrade.
- Construction at the Hunt Wellfield would commence immediately following design and the site-specific DPH approvals.
- The water diversion permit application and sale of excess water application would be filed with the Connecticut Department of Energy and Environmental Protection (CT DEEP) and the Connecticut Department of Public Health (DPH), respectively, at the end of the pipeline design. This timing is necessary, as the designs could be incorporated into the permit applications.
- Construction of the Rockville WTP package plant, pipeline, and Tolland pumping station upgrades would be deferred to the completion of the water diversion permit and sale of excess water permit processes.

MDC Interconnection

A 53-month schedule is estimated. Important assumptions include:

- Design and permitting/approvals would commence immediately for the pipeline, pumping stations, and pressure-reducing station. The approvals included in this timing may include the following from DPH: water main approval for the pipeline, pumping station approvals, and treatment system approvals for the re-chlorination stations installed at pumping stations.
- The sale of excess water permitting process would occur parallel with the year-long design process.
- The water diversion permit application would be filed with CT DEEP toward the end of the design process. This timing is necessary, as the design could be incorporated into the permit application.
- Construction of the pipeline and pumping stations would be deferred to the completion of the water diversion permit process.

WWW Interconnection

A 36-month schedule is estimated. Important assumptions include:

- Design and permitting/approvals would commence immediately for the WTP expansion and the pipeline with related improvements to pumping. The approvals included in this timing may include the following from DPH: treatment plant approval for the expansion and water main approval for the pipeline.
- Design and permitting/approvals may start at any time during the initial years for the new tank and pumping station. The approvals included in this timing may include the following from DPH: pumping station approval and storage tank approval.
- Design would commence immediately for the dredging of the Willimantic Reservoir and securing the necessary approvals from CT DEEP and DPH. The permitting process for hydraulic dredging is more rapid than the permitting process for sediment excavation through mechanical means, but a full year has been provided for permitting combined with design regardless of the selected method.
- Revision of the Natchaug River instream flow study would commence immediately along with the design processes described above.
- Immediately following the revision of the instream flow study, and toward the end of the design processes for the WTP expansion and pipeline, the water diversion permit applications and sale of excess water application would be filed with CT DEEP and DPH, respectively. This timing is necessary, as the designs could be incorporated into the permit applications.
- Sediment removal would commence immediately following its associated design and permitting.
- Construction of the WTP expansion, pipeline, tank, and pumping station would be deferred to the completion of the water diversion permit and sale of excess water permit processes.

12.6 COSTS AND BENEFITS

Table 12.6-1 presents a summary of capital costs associated with the feasible alternatives, as well as a normalized cost per million gallons (MG) of water. Table 12.6-2 presents a comparison of potential water rates for residential and commercial customers using the Public Utility Regulatory Authority (PURA) annual household consumption value. For this analysis, commercial customers are assumed to consume an equal amount of water as residential customers, and the estimates include any applicable service charges (though not initial construction and connection fees which would be borne by the consumer).

TABLE 12.6-1
Summary of Estimated Interconnection Costs

	CWC Interconnection	MDC Interconnection	WWW Interconnection
Capital Cost	\$20,113,200	\$51,276,000	\$44,377,800
Normalized per MG*	\$10,056,600	\$25,638,000	\$22,188,900

*Assumes 2.0 mgd

TABLE 12.6-2
Summary of Average Annual Water Costs to Customers

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

Sources: CWC website, MDC Website, WWW, Tolland Water Commission, UConn, Tighe & Bond
 Note: Tolland rates assume that an equal amount of water is used each quarter.

Although this EIE has not estimated additional energy costs for the alternatives, the water systems that are more proximal and at higher elevations (CWC and WWW) will use less energy than systems that are distant and at lower elevations (MDC) to move water to the University and Mansfield.

The following positive benefits are expected to occur as a result of the construction of or connection to additional sources of water supply:

- Increase the University water system’s MOS to above 1.15 for the 50-year planning period while meeting the four committed demands.
- Enable the appropriate supply of public water to proposed expansions on the University campus, such as the University Technology Park and redeveloped facilities at the Depot Campus as outlined in the University of Connecticut Academic Plan that will result in an overall improvement of the campus environment.
- Provide additional redundancy and flexibility to the University of Connecticut water system.
- Allow for the University to reduce potential impacts to fisheries within the Willimantic and Fenton rivers during low streamflow periods by utilizing water supply from a less sensitive area.
- Supply the Mansfield Four Corners area with public water supply, eliminating the need for utilizing existing wells in a historically contaminated area and spurring redevelopment of this area that is one of the gateways to the University of Connecticut.
- Enable the appropriate supply of public water to proposed growth areas identified in the Town of Mansfield *Plan of Conservation and Development*.
- The potential for supply redundancy to one or more small community water systems in Mansfield, as well as a potential increase in access to public water for adjacent residents with low-yielding wells or wells with poor water quality.
- Temporary engineering and construction jobs related to implementing the eventual project, as well as additional long-term jobs in the proposed University Technology Park, the

redeveloped buildings on the Depot Campus, and in commercial developments in Mansfield Four Corners.

12.7 TECHNICAL, MANAGERIAL, AND FINANCIAL CAPACITIES

Numerous options are available relative to ownership of supply systems and provision of service. Each is discussed below.

12.7.1 UNIVERSITY OF CONNECTICUT

At present, the University owns the supply sources and transmission appurtenances, and all off-campus connections are customers of the University. Under any of the feasible alternatives, the University has the ability to contract with the source utility (i.e. CWC, MDC or WWW) to purchase water for use on- or off-campus. The University has gone on record that its role as a water supplier is not central to its mission as an educational institution and that it does not have a desire to expand its current role with regard to water supply.

The University has demonstrated its technical, managerial, and financial capacity over years of operating its supply system and can continue to do so in the future. As noted in the University's *Water and Wastewater Master Plan*, "the current contract operations agreement between the University and New England Water Utility Services, Inc. (NEWUS), along with a continued vigilance on the part of the University, is currently resulting in proper system management."

12.7.2 TOWN OF MANSFIELD

Under all of the feasible alternatives, the Town of Mansfield could potentially become a public water utility, regardless of the source of supply. Mansfield could become a consecutive water supplier, purchasing water from the University, CWC, MDC, or WWW. The Town of Mansfield has demonstrated its capabilities relative to public water supply. In particular, the Town has prepared a comprehensive water supply plan; is an active participant on the University's Water and Wastewater Advisory Committee; and has undertaken investigations of potential groundwater supplies. As a municipality, the Town does not currently have the technical ability to run a water system; however, as in many other municipalities throughout the state, contract operation of a municipal water system is an option. The Town is believed to have the financial and managerial capacity required to operate a consecutive water system.

12.7.3 OTHER ENTITIES

While possible, it is unlikely that MDC or WWW would directly serve customers within the Town of Mansfield, with the possible exception of customers in the southern part of Mansfield directly adjacent to WWW's existing distribution system. Under the MDC and WWW interconnection alternatives, either the University or a consecutive water system, including possibly the Town of Mansfield, would likely become the water purveyor.

Under the CWC interconnection alternative, CWC could sell treated water to the University as well as directly serve areas within the Town of Mansfield that require water service. Alternately,

CWC could operate a consecutive¹ water system that purchases water from the University for resale in Mansfield Four Corners and other areas of the Town of Mansfield that require water service. In this scenario, customers along the interconnection route would become direct customers of CWC with some exceptions. For instance, existing Town of Tolland customers along Route 195 would remain Town of Tolland customers (although they could be served with CWC water as described above). New water mains associated with the North Hillside Road extension could be owned and operated by the University. Alternately, any Tech Park site occupants that are not directly affiliated with the University could be direct CWC customers. CWC already possess technical, managerial, and financial capacities as a viable water purveyor. CWC supplies wholesale water supplies to other public water systems and therefore has policies in place to continue doing so.

WWW does not currently serve water to any other water systems and therefore would have a somewhat limited institutional capacity to begin selling water via a wholesale agreement, but it is likely that WWW could effectively supply water to the University.

12.8 PREFERRED ALTERNATIVE

In light of the foregoing analysis, three alternatives are potentially feasible, with the ability to meet the project purpose and need. While the degree and types of potential impacts vary among the alternatives, none is believed to cause significant adverse environmental impacts that cannot be mitigated. For the CWC and WWW alternatives, potential impact is similar among the alternate routing scenarios within each alternative. For the MDC interconnection, routing alternative #4B will result in significantly fewer land use conflicts between existing land uses, local zoning regulations, and the State *Conservation and Development Policies Plan*. In all cases of conflict, land use overlay zones could overcome such inconsistencies; however, at the present time, only the Town of Mansfield has committed to such a course.

Issues of cost, phasing, and financing will be critical to the ultimate action taken. Financial feasibility and project affordability will be informed by funding sources, cost sharing arrangements, financing mechanisms, and project phasing. Project affordability includes the total cost of ownership over time in combination with how that cost might be shared among the parties who will be the beneficiaries.

Each of the interconnection alternatives must overcome financial, technical, regulatory, and contractual hurdles to become a reality, any one of which could prevent the alternative from moving forward. As such, it is the University's intent to proceed with multiple potential "preferred" alternatives for interconnection with CWC, MDC, or WWW.

¹ A consecutive water system is a water system that has no water source of its own, but rather purchases water from another water company for resale in its service area.