

8.0 ALTERNATIVE #4 – INTERCONNECTION WITH THE METROPOLITAN DISTRICT COMMISSION

8.1 ASSESSMENT OF FEASIBILITY

This alternative involves a water supply interconnection with the Metropolitan District Commission (MDC). MDC operates a large public water utility that serves its eight member towns and a number of nonmember towns that are within a 20-mile radius of the State Capitol. Two interconnection routes have been evaluated to interconnect the MDC system in East Hartford to serve the University of Connecticut (University) and Mansfield. Pipeline corridors are described in detail in Section 3 of this document. The total project cost would depend upon the selected routing and quantity of water transmitted.

In its scoping comments for this project, the Connecticut Department of Public Health (DPH) calculated the amount of water that MDC would have available for sale in the future while maintaining a margin of safety (MOS) of 1.15 under the average day demand (ADD), maximum month average day demand (MMADD), and peak day demand (PDD) condition. Table 8.1-1 presents the results of this analysis for MDC's projected demands.

**TABLE 8.1-1
Projected Water Available (MG) for Additional Bulk Sales
in the MDC System While Maintaining a MOS of 1.15**

Year	ADD	MMADD	PDD
2012	5.70	16.03	10.95
2020	3.92	13.87	8.34
2050	1.58	11.00	4.89

MG = million gallons

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. Based on the above numbers, it appears that MDC has sufficient capacity to supply these amounts of water through a pipeline to the University and Mansfield through the year 2050.

The Connecticut DPH further calculated projected demands and MOS for the MDC System with the addition of a regional pipeline to the University and Mansfield under a variety of flow scenarios. The figures presented in the scoping memorandum dated June 29, 2012 were expanded to evaluate additional flow scenarios. The combined data are presented below in Table 8.1-2. It is noted that the MDC utilizes an average day safe yield based upon drought conditions in the 1960s, which is more conservative and exceeds the 99% dry year required for water supply plans. Additionally, the proliferation of water-saving devices has reduced ADDs for many water companies. In MDC's case, the actual consumption has been approximately 50 mgd, which adds approximately 7 mgd of available water.

TABLE 8.1-2
Projected Water Demands in the MDC System with Regional Pipeline to Mansfield

Year	ADD (MG)	ADD MOS	MMADD (MG)	MMADD MOS	PDD (MG)	PDD MOS
<i>Regional Pipeline at 0.5 mgd</i>						
2012	54.11	1.26	69.65	1.41	83.95	1.29
2020	55.89	1.22	71.81	1.36	86.56	1.25
2050	58.23	1.17	74.68	1.31	90.01	1.21
<i>Regional Pipeline at 1.0 mgd</i>						
2012	54.61	1.25	70.15	1.40	84.45	1.29
2020	56.39	1.21	72.31	1.35	87.06	1.25
2050	58.73	1.16	75.18	1.30	90.51	1.20
<i>Regional Pipeline at 3.0 mgd</i>						
2012	56.61	1.20	72.15	1.36	86.45	1.26
2020	58.39	1.17	74.31	1.32	89.06	1.22
2050	60.73	1.12	77.18	1.27	92.51	1.17
<i>Regional Pipeline at 5.0 mgd</i>						
2012	58.61	1.16	74.15	1.32	88.45	1.23
2020	60.39	1.13	76.31	1.28	91.06	1.19
2050	62.73	1.09	79.18	1.24	94.51	1.15

Note: Yellow shading indicates a MOS below 1.15.
 MG = million gallons

The figures in Table 8.1-2 indicate that MDC has sufficient capacity to supply a regional pipeline to the University and Mansfield up to 3.0 mgd under ADD, MMADD, and PDD conditions while maintaining a MOS of near or above 1.15.

In summary, MDC 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.

8.2 LAND USE AND ZONING

An interconnection between MDC and the University and Town of Mansfield has the potential to affect land uses in the towns through which the pipeline runs. Two pipeline routes are possible to provide water from MDC's system in East Hartford to Mansfield. The first would run from East Hartford, through Manchester, Bolton, and Coventry to reach Mansfield (Routing #4A). East Hartford is already served by public water along the affected pipeline segment such that impacts to land use and zoning are not expected. Potential impacts to Bolton, Coventry, and Mansfield are described below.

The second pipeline route would run from East Hartford, through Manchester, South Windsor, Vernon, Tolland, and Coventry to reach 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 and zoning are not expected. Potential impacts for Tolland, Coventry, and Mansfield are described below.

8.2.1 TOWN OF BOLTON

Interstate 384 Corridor

Potential pipeline routing through Bolton runs along Interstate 384 for approximately 1.6 miles (Refer to Figure 3.5-2). From the Manchester town line to its junction with Route 44, I-384 passes through mainly State Plan designated Conservation Areas with a few adjacent Preservation Areas, Rural Lands, and Existing Preserved Open Space (corresponding to Bolton Notch State Park). The Capitol Region Council of Governments (CRCOG) plan shows the Bolton portion of I-384 in Low and Middle Intensity Development designated areas. Parcels adjacent to the highway are zoned R-1 except for a small area of R-2 zoning and an expanse of GB zoning on the north side of the highway east of Williams Road.

Because the north side of the highway is zoned GB east of Williams Road and then occupied by Bolton Notch State Park from Bolton Notch Pond to the Route 44 intersection, there are only two areas of potential development along I-384:

- North side of highway from Manchester town line to Route 85 (zoning R-1 and R-2)
- South side of highway from Manchester town line to Notch Road (zoning R-1 and R-2)

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. The town'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.

Bolton's zoning regulations allow the following in R-1 and R-2 zones: single- and two-family dwellings, parks, farming, municipal facilities, churches, private schools, child care facilities, and continuing care facilities for adults (not more than four units per acre). Multiple-dwelling complexes are not allowed in R-1 zones but are allowed in R-2 zones. These two zoning classes are believed to be somewhat protective against intense development that could be induced by the availability of a public water supply system.

Revision of zoning and subdivision regulations to allow subdivision of land and development of lots in the R-1 zone commensurate with what could occur if the lots were dependent on individual private wells is an option. This restriction would allow subdivision and development of lots similar to that which could occur at the present time in R-1 zones but would prevent more intense development that could arise from access to a public water system. Possible amendments are as follows (changes shown in *italic underlined* text):

- Zoning Regulations, Section 6 – Residence Zones
6D – Availability of Public Water Supply. In R-1 zones, the availability of a public water system or public water supply shall not allow development at a higher density than the use of individual private wells would permit.

- Subdivision Regulations, Section 13 – Utilities

13.1 Water Supply – Each lot must be provided with an adequate supply of clean water in accordance with the Public Health Code of the State of Connecticut and, as appropriate, in accordance with the Public Utilities Commission of the State of Connecticut. Water supplies on adjacent properties shall not be adversely affected. Where private wells are to be used, each required well location shall be shown with the required separating distances from sewage disposal systems, footing drains, etc. In R-1 zones, the availability of a public water system or public water supply shall not allow development at a higher density than the use of individual private wells would permit.

Note that these amendments would not be appropriate unless the University and the Town of Mansfield select an MDC pipeline route along I-384 and Route 44 as the preferred additional water supply.

Route 44 Corridor

Potential pipeline routing through Bolton runs along Route 44 for approximately 1.6 miles (Refer to Figure 3.5-2). 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. Parcels adjacent to Route 44 are zoned R-1, R-3, I, General Business (GB), Rural Mixed Use Zone (RMUZ), and Gateway Mixed Use Industrial Zone (GMUIZ).

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

- Goal #1/Policy #1 (Purpose of Sewers) states that the sewer system will "provide opportunities for new and expanded businesses in the Route 44 corridor. The majority of businesses in Bolton are already located along Route 44 and the majority of the business and industrial zoned areas are located along this highway. The remainder of the town has a distinctly different rural and residential character. It is the intent of the town to maintain these distinct business and residential areas."
- Goal #1/Policy #3 (Zoning in the Sewer Service Area) states that "the zoning regulations for the residential portions of the sewer service area should incorporate special permit requirements to discourage new development on older unoccupied properties that cannot support septic systems and do not conform to the current zoning regulations. The zoning regulations for the business and industrial portions of the sewer service area should encourage new development for both developed and undeveloped properties. Consideration should be given to creating new business and industrial zones for the sewer service area that could allow a greater variety and density of uses than in the non-sewered areas."
- Goal #1/Policy #4 (Other Utilities in the Sewered Area) states that "Extensions of water mains and natural gas mains along Route 44 in the sewerred area should be encouraged. Water mains provide large and reliable volumes of potable water and improve fire

protection. Water mains will allow businesses with high water demands such as restaurants and businesses with fire protection requirements, such as sprinklers, to locate in the sewered area."

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

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

- To preserve valued community and natural resources and safeguard land identified for preservation
- To encourage economic development consistent with the scale and character of activity described in the Route 44 Vision Statement
- To locate development where there is or will be infrastructure (water, sewer, and roads) and concentrate development there before using raw land
- To place priority on reuse of previously developed sites in targeted growth areas
- To place priority on locating new development in targeted growth areas
- To pursue a compact, mixed-use pattern of development for targeted growth areas that preserves or creates walkable neighborhoods and village character
- To foster a range of type and style of housing so that households from young adults to seniors can choose to live in town
- To promote a transportation system that encourages travel by a variety of means (walking, bicycling, and transit in addition to the automobile)
- To create a multi-faceted transportation system that conveniently links the targeted growth areas with one another and with the historic village center of Bolton

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

The Town of Bolton has a strong vision for Route 44 and clearly desires the extension of water and sewer systems to support business and related development. As noted in the town's *Plan of Conservation and Development*, the current State Plan conflicts with the intended management of the Route 44 corridor. In contrast, 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.

8.2.2 TOWN OF 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 mitigating 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.

The Town of Coventry adopted its *Plan of Conservation and Development* in 2010. The plan describes three "Special Planning Areas for Growth and Infill" that are located along Route 44 (a total of 11 are designated in the town):

- "Special Planning Area 1: Rte 44/ Bolton Gateway – Commercial, Professional Office and adjacent Commercial Agricultural zones. The area presently contains several commercial/retail establishments on the south side of Route 44. Opportunities exist for new development, in-fill and re-use. There are two houses of historic value on Cedar Swamp Extension, and there is a significant vista to the south. There is good access to route I-384, with improvements to Route 44 in Bolton, and future sewer plans in Bolton present the opportunity to use this infrastructure. Utilize the commercial development design guidelines to consider the following:
 - Recognize that this area is the gateway to Coventry and creates a first impression of the Town.
 - Consider changing zoning regulations to provide larger setbacks and parking in the rear of commercial buildings.
 - Apply access management strategies to minimize curb cuts and consider shared and interconnected parking.
 - The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."

- "Special Planning Area 2: Rte 44/ Bread & Milk Street Commercial zone. The area currently contains several retail and service establishments on the north side of Route 44 and a public

golf course on Bread & Milk Street. Opportunities exist for new development along the east side of Bread & Milk Street where there is a large vacant parcel that has had prior commercial interest. There is a historic house on the northwest corner of Route 44 and Bread & Milk Street. Public sewer does not exist. A public water supply exists in the adjacent Pilgrim Hills subdivision.

- Consider a community sewer treatment system
 - Consider another access to Route 44 from the site east of Bread & Milk Street
 - Minimize curb cuts particularly adjacent to the intersection
 - Utilize the commercial development design guidelines
 - Target businesses compatible with the neighborhood (Pilgrim Hills and Northfields subdivisions) and existing businesses.
 - The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."
- "Special Planning Area 3: North Coventry Village (Route 44/Route 31/Grant Hill Road) Commercial zone. One of the most active retail sites in town, this area includes Meadowbrook Plaza which, in 2009, received a significant exterior upgrade. The North Coventry Fire Station and the Coventry Grammar School are adjacent to the east. Several historic homes exist on Stage Road and north of Route 44 to the west. The Walgreens and the CVS/Bank site have further potential development adjacent to them. No sewers exist, but there is public water supply infrastructure on site. Consider an overall strategic plan for the area that includes:
- The potential for a community septic system to serve the area.
 - Careful attention to traffic patterns at and near the intersection, particularly on Route 44 near the entrances to Meadowbrook Plaza.
 - A rear traffic access from Route 44 (south side) to Main Street (southwest side)
 - Respect the historic homes, the rural character and the adjacent farms.
 - Utilize the commercial development design guidelines.
 - Target new development on the site east of Walgreens, northeast of Dunkin Donuts, across Main Street from Dunkin Donuts, the area adjacent to Meadowbrook Plaza, a site north of Route 44 west of the old Pomeroy Tavern, and a site north of Stage Road.
 - Consider shared and interconnected parking where possible.
 - Consider a zoning map change to restrict commercial access to Grant Hill Road.
 - Respect Coventry and Olson brooks as natural resources.
 - Maintain or expand the green, landscaped areas adjacent to the intersection.
 - The site includes a commercial/agriculture zone and uses should target the economic vitality of farms."

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

The designation of a special planning area does not imply that development is desired throughout. In fact, the Coventry *Plan of Conservation and Development* designates "preservation focus areas" in each of the three special planning areas along Route 44. Preservation focus areas make

up the majority of Special Planning Area 1, the portion of Special Planning Area 2 on the south side of Route 44, and the southwest corner of Special Planning Area 3.

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

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

Section 6.06 of Coventry's zoning regulations provides the following guidance for C/A zoning:

- Uses Not Requiring Site Plan Review by the Commission – The following uses are permitted in the Commercial/Agricultural Zone upon the issuance of a zoning permit by the Zoning Agent:
 1. Agriculture on a lot containing a single-family or two-family dwelling, or on a lot or lots adjacent to, and under the same ownership as, a lot containing a single-family or two-family dwelling....
 2. Sales of agricultural products grown on the premises
- Uses Requiring Site Plan Review by the Commission – The following uses are permitted in the Commercial/Agricultural Zone upon the issuance of site plan approval by the Commission:
 1. Historic sites and monuments that are open to the public, with or without an entrance fee
 2. Tourist homes or bed-and-breakfast facilities
 3. Agricultural show areas
 4. Riding; carriage, wagon and sleigh rides; boarding and instructional activities related to the keeping of horses
 5. Storage and repair of farm vehicles and similar agricultural equipment, not to include operation of a repair garage for other motor vehicles
 6. Greenhouse/nursery
- The Commission may issue a special permit for the following uses in the Commercial/Agricultural Zone:
 - a. Philanthropic, educational, religious, cemetery and charitable uses
 - b. Fairgrounds
 - c. Bazaars, festivals, auctions, carnivals, circuses, and other, similar, temporary activities
 - d. Housing, camps and dormitories for seasonal farm workers....
 - e. Storage, packaging, processing and bottling of farm products
 - f. Retail trade, up to 7,500 square feet of gross building floor area per lot

- g. The raising of animals other than common domestic household pets....
- h. Feed and grain stores and tack shops
- i. Retail sales of farm products
- j. Farm stores, provided the majority of the products sold are agricultural and not including manufacture of farm equipment
- k. Veterinary clinics
- l. Construction and sale of agricultural and livestock-related products, including but not limited to troughs and jumps
- m. Wineries

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

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

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

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

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

The C/A zoning class is consistent with the town's designated preservation focus areas, generally consistent with the State Plan designations, and believed to be protective against intense development that could be induced by the availability of a public water supply system. However, the C, PO, GR-40, and GR-80 classes have a variety of allowances that make them less protective and could possibly allow intense development when parcels in the districts are exposed to a new water supply main. The potential for large-scale commercial development in the C zoning district and Designed Apartment/Condominium Developments in the residential zoning districts are of most concern. Therefore, additional protections may be appropriate for the C, PO, GR-40, and GR-80 zoning districts along Route 44.

While installation of a water transmission main through conservation areas is not 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.

Several options for regulating development along potential water supply extensions are generally available to Coventry: (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. Two additional options in Coventry appear possible: (4) zoning and/or subdivision regulations could be amended to require that development be only as possible using individual wells; or (5) specifically prohibit certain types of development in specific locations. Precedent for the fifth option is set in Section 5.13 of the zoning regulations where the regulations state "*no such permit shall be issued for any such development [Designed Apartment/Condominium Developments] in the drainage basin (watershed area) of Coventry Lake (Wangumbaug Lake).*" This clause prohibits Designed Apartment/Condominium Developments from a specific watershed. Pros and cons are as follows:

1. The first option is believed to fall short of providing strong protections.
2. The second option is not favored because it would have required references to the state's plan, which is being updated with potentially major changes.
3. An overlay zone could have strong potential for guiding development along Route 44 if a water main were available.
4. If the regulations for the C, PO, GR-40, and GR-80 zoning districts were amended to allow development only as it would occur using individual private wells, this could create hardships where the larger public water systems in the town are already present (for example, surrounding Coventry Lake). If new developments, redevelopments, or even simple one-lot subdivisions were proposed in these areas, it is reasonable to anticipate that they could or should be served by the existing nearby public water system.
5. If the approach used in Section 5.13 of the zoning regulations were selected and specific developments were prohibited by type from the Route 44 corridor, this approach would require the Planning and Zoning Commission to foresee a full range of potential developments that could be inappropriate relative to the State Plan designations.

The third option has the least potential for causing problems and would provide protections consistent with the State Plan. The specific method of preventing intense development would be 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. Such controls could be paired with amendments to the zoning and subdivision regulations or could be implemented through an overlay zone.

Figure 8.2-1 depicts a potential "Route 44 Overlay Zone" (R4OZ). If such a zone were adopted, Coventry's zoning regulations would need to be amended to add the overlay zone as Section 6.15:

- Section 6.15.01. Statement of Purpose. The R4OZ District is intended to discourage intensive development or redevelopment along Route 44 if a public water supply pipeline with excess capacity is installed along the roadway.
- Section 6.15.02. Establishment of District. The Commission shall establish an R4OZ District only upon installation of a pipeline conveying treated water along Route 44 from the MDC service area in East Hartford to the University of Connecticut and Town of Mansfield.
- Section 6.15.03. Specific Design Standards. The availability of a public water supply pipeline along Route 44 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 R4OZ district 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 Commission. If the proposed action could be supported by on-site water supplies, then connection to the pipeline in Route 44 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.
- Section 6.15.04 Permitted Uses. Any allowed uses in the C/A, C, PO, GR-40, and GR-80 may be allowed in an R4OZ District subject to the Specific Design Standards in Section 6.15.03.

While adoption of a zoning overlay is possible, no commitment has been made to do so. Adoption of an overlay zone along Route 44 would not be appropriate unless the University and the Town of Mansfield select an MDC pipeline along Interstate 384 and Route 44 as the preferred additional water supply or a portion of the preferred additional water supply.

8.2.3 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.

8.2.4 TOWN OF MANCHESTER

The Interstate 84 corridor is comprised of mainly Neighborhood Conservation lands, with the exception of Conservation and Preservation areas designated along the Hockanum River in the State Plan. These lands are largely precluded from development due to the wetlands and open water present. The *Capital Region Plan of Conservation and Development* depicts Middle Intensity and Higher Intensity Development areas along Interstate 84. Because the Interstate 84 corridor is fully developed and already relies on the town's public water system, a pipeline from MDC (pipeline segment 7) will not directly spur development in this area.

The Interstate 384 corridor (pipeline segment 2) is comprised of mainly Neighborhood Conservation lands, designated Growth Areas, and a small portion of the town's Regional Center designation. Existing preserved open space is present on the north and south sides of the highway at the Charter Oak Wellfield and Globe Hollow Water Treatment Plant, respectively; and at Howard Reservoir in eastern Manchester. These are all existing municipal water facilities that are inherently protected from regional pipeline-induced development. Conservation areas are depicted in the State Plan on the south side of Interstate 384 in the southeast corner of the town, but the town's public water system is already present in this area. The *Capital Region Plan of Conservation and Development* depicts Middle Intensity and Higher Intensity Development areas along Interstate 384, including areas that the State Plan designates as Conservation area. Because the Interstate 384 corridor is substantially developed or designated as a growth area and already relies on the town's public water system, a pipeline from MDC will not directly spur development in this area.

The more germane question relative to development in Manchester is whether the presence of an MDC pipeline though the town could indirectly spur development by provision of additional water to the Manchester Water and Sewer Department through any number of new interconnections. The department could then purchase this additional increment of water and allocate it to development anywhere in the town.

At the present time, the Manchester Water and Sewer Department believes that its available water supply and projected water needs are well balanced. The town's *Individual Water Supply Plan* was submitted to DPH in 2007. Review comments were received in 2012. Given the five-year span between plan submittal and receipt of comments, the development pressures present in 2007 are no longer apparent in Manchester. The current average day, maximum month, and peak day demands in Manchester are 5.02 mgd, 6.49 mgd, and 7.48 mgd, respectively. These figures are lower than the estimated water demands for the year 2012 that were projected in 2007. Available water is in excess of the current demands plus 15%. If a development proposal were to be advanced in Manchester, the Water and Sewer Department would be obligated to serve the

development if private wells were not feasible and would be able to serve the development using current supplies.

Rather than spurring development in Manchester, a pipeline from MDC could provide a potential source of emergency supply for the town. The proposed pipeline route would travel through Manchester's low, middle, and high service areas, allowing an emergency interconnection to any of these service areas. This would be a valuable asset to the town's water system. The Manchester Water and Sewer Department and MDC public water systems are already close to one another along Silver Lane. An emergency interconnection could be developed in this area without installing pipelines along Interstate 84 or Interstate 384.

8.2.5 TOWN OF SOUTH WINDSOR

Four parcels zoned for industrial use are located adjacent to Interstate 84 (pipeline segment 7) in the town of South Windsor. The parcels are identified in the town's *Plan of Conservation and Development* as available for industrial development. Residentially zoned and residential developed land is located adjacent to the four parcels. These areas are already served with public water supply from the Connecticut Water Company (CWC). The *Capital Region Plan of Conservation and Development* identifies the parcels as a "higher intensity development area," and the State Plan depicts Neighborhood Conservation areas throughout the southeast corner of South Windsor.

Given the existing and intended use of the parcels adjacent to Interstate 84 and the availability of public water supply to these parcels, mitigation for induced growth is not necessary. A pipeline from MDC will not spur development in this area.

8.2.6 TOWN OF VERNON

The CWC serves the town of Vernon through the Northern Operations Western System. The public water system has significant coverage in Vernon including the northern portion of the town (north of Interstate 84) and two areas of the town south of Interstate 84. Because the Interstate 84 corridor already has access to the public water system, a pipeline from MDC is unlikely to directly spur development along the highway.

Interstate 84 in Vernon is flanked by state-designated Neighborhood Conservation lands along its northern edge from South Windsor to Exit 67. A designated Growth Area is located on the north side of the highway at Exit 67. Neighborhood Conservation lands are located along the south side of the highway from the South Windsor town line to Tunnel Road. East of Tunnel Road, there are two designated Growth Areas and two designated Conservation Areas.

The Neighborhood Conservation areas in Vernon are largely supplied with water from the CWC system. A pipeline from MDC along Interstate 84 is not incompatible with land uses in these areas, and induced development is not a concern. Likewise, designated Growth Areas are partly supplied with water from the CWC system. A pipeline from MDC along Interstate 84 is not incompatible with land uses in these areas; therefore, induced development is not a concern.

The two designated Conservation Areas on the south side of I-84 are important to consider separately and with an additional level of detail:

- The westernmost of the two designated Conservation Areas is bounded by Tunnel Road on the west and Bolton Road on the east. This area is locally zoned for commercial (C) and industrial (I) land uses and has excellent highway access via South Frontage Road. The Ron-a-Roll roller skating rink is located in this area and is highly visible from Interstate 84. The *Vernon Plan of Conservation and Development* designates this area as the "Exit 66 Opportunity Area," and the town desires commercial development in this location. Consistent with the *Vernon Plan of Conservation and Development*, the *Capital Regional Plan of Conservation and Development* depicts this area as designated for Middle Intensity Development. The *Vernon plan* notes that the State Plan and the local plan are inconsistent in this location and states that *"The Vernon Plan of Conservation and Development is generally consistent with the State Plan map with one exception. This Plan of Conservation and Development supports continued business development adjacent to Interstate 84 in the Exit 66 area and supports extending sewers to this business area. The State Plan labels this area as Preservation and Conservation, likely due to the water resources located here. The Town should work with the State to determine options that will protect these water resources while allowing compatible development."*
- The easternmost of the two designated Conservation Areas is bounded by Bamforth Road on the west (approximately) and the former New England Sportsplex on the east. The former New England Sportsplex is visible from Interstate 84 and is located within the designated Growth Area. This relatively long span of land located in the state-designated Conservation Area is completely zoned R-27 (residential) and includes a few residential lots. However, it is mostly occupied by designated open space.

Commercial development is already present and additional development is desired in one of the state-designated Conservation Areas (the Exit 66 Opportunity Area). The second state-designated Conservation Area is largely occupied by existing dedicated open space. Therefore, local land use controls to prohibit induced development are not needed if a pipeline from MDC were installed along Interstate 84.

The more germane question relative to development in Vernon is whether the presence of an MDC pipeline through the town could indirectly spur townwide development by provision of additional water to the CWC through new interconnections. CWC could then purchase this additional increment of water and allocate it to development anywhere in the town of Vernon, or elsewhere in the Northern Operations Western System.

At the present time, CWC believes that its available water supply and projected water needs are well balanced in the Western System. If a development proposal were to be advanced in Vernon, the CWC would be obligated to serve the development if private wells were not feasible and would be able to serve the development using current supplies. In particular, the CWC has indicated that it is prepared to provide water service to development proposed in the Exit 66 Opportunity Area at any time.

Rather than spurring development in Vernon, a pipeline from MDC could provide a potential source of emergency supply for the CWC. However, CWC and MDC public water systems are already interconnected in other locations, so this capability already exists.

8.2.7 TOWN OF TOLLAND

From the Vernon town line to Route 195, Interstate 84 passes through mainly state-designated Rural Lands in the town of Tolland. State-identified Existing Preserved Open Space is depicted on the north side of the highway at the west and east ends of this segment. The state-identified Existing Preserved Open Space at the west end of Interstate 84 is actually a commercial/industrial park whereas the state-identified Existing Preserved Open Space at the east end near Route 195 is developed with municipal ball fields. A designated Preservation Area is located adjacent to the Exit 68 interchange with Route 195; this is Tolland Marsh Pond (an impoundment along the Skungamaug River). Small extensions of Conservation and Preservation lands intersect the highway along watercourses.

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

The purposes of these diverse zoning districts are defined in Tolland's zoning regulations:

- Residential Design Districts – The purpose of the regulations in the Residential Design District is 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; promote the most appropriate use of the land, considering its particular topography, size, shape, soils, natural features, historic assets and other similar features; preserve wetlands and otherwise control new developments so as to minimize hazards resulting from stormwater runoff, stream flooding and erosion through the implementation of Low Impact Development strategies; protect the natural scenic, semi-rural character and ecologically important features of the town's remaining undeveloped land; provide the maximum land area for open space, park and recreation purposes, including trails; provide greater protection in the Natural Resource & Wildlife Protection Areas.
- Commercial/Industrial – The purpose of the CI Zones is to provide for larger scale, more intense commercial and light industrial uses.
- Tolland Business Park Zone – The purpose of the TBP Zone is to provide for light industry, offices, and other suitable uses that allow for flexible site development while retaining the natural site features and encouraging sound and aesthetically pleasing commercial and industrial development.
- Tolland Village Area – The purpose of the TVA is to expand economic development and housing opportunities at the Interstate 84 interchange in Tolland with architecture and land use patterns that are reflective of a traditional New England village.

- Gateway Design District – The purpose of the GDD 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.

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

The CWC already provides public water service to the commercial/industrial park located on the north side of I-84 in the C/I and TBP districts. Potential for induced development is therefore low as these parcels are already developed. Likewise, CWC provides water service along Route 195 on the north side of Interstate 84 (TVA zoned land), and the Town of Tolland provides water service along Route 195 on the south side of Interstate 84 (GDD zoned land). Potential for induced development is likewise low as these parcels are partly developed and may be additionally developed at any time via existing water systems.

Public water service is not currently available in the RDD and RDD-Natural Resource and Wildlife Protection Area districts located on the north and south sides of Interstate 84 between the existing commercial/ industrial park and the Route 195 interchange. These areas are not particularly at risk for induced development due to existing low-density residential uses, steep slopes, extensive wetlands, and the limited roadway networks available. The potential for secondary growth is discussed in Section 8.3.

Potential land use impacts along Route 195 were discussed in Section 7.2. The Town of Tolland could potentially utilize an overlay zone in areas along both the Interstate 84 and Route 195 that currently do not have public water service in order to restrict potential development in a manner similar to that proposed for Mansfield. Potential overlay zones are depicted on Figure 8.2-2. While adoption of a zoning overlay is possible, no commitment has been made to do so. Adoption of an overlay zone along these routes would not be appropriate unless the University and the Town of Mansfield select an MDC pipeline along Interstate 84 and Route 195 as the preferred additional water supply or a portion of the preferred additional water supply.

8.3 SOCIOECONOMICS

Under this alternative, the University would be in a better position to service its committed 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 Manchester, South Windsor, Vernon, Tolland, Bolton, and Coventry. This would affect socioeconomics as discussed below. Note that East Hartford is not included in this analysis as MDC already provides public water supply in the section of East Hartford that would be affected by the proposed pipeline. This would affect socioeconomics as discussed below.

8.3.1 DEMOGRAPHICS

Town of Bolton

The Town of Bolton appears to desire additional commercial and mixed-use development along Route 44. This development could spur additional residential development in the community by making the town a more attractive place to live and work with more services offered. In addition, several residentially zoned parcels are located adjacent to the potential water main under routing scenario #4A. 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 in this area. Thus, the total population in Bolton could increase as a result of the project if routing scenario #4A was selected. A detailed buildout analysis in this area to determine potential population growth is not appropriate since the town will be selectively encouraging projects. However, it is possible that several hundred new residents could live in new mixed-use or residential developments along Route 44.

The area along Interstate 384 is of greater interest for a buildout analysis. Several large parcels zoned as R-1 and R-2 are located adjacent to the state right-of-way where pipeline could potentially be routed 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.

Table 8.3-1 presents the potential developable areas immediately adjacent to Interstate 384 and the potential population that could result from development. Parcels without extensive undeveloped areas, floodplains, commercially and industrially zoned areas, and existing land owned by the State of Connecticut are not included as developable areas for this calculation. 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.).

Based on the figures in Table 8.3-1, the total population of Bolton could increase by almost 500 if parcels adjacent to the proposed water main (scenario #4A) adjacent to Interstate 384 were fully developed, with additional populations being realized in residential and mixed-use developments along Route 44. 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 other types of development that would reduce the potential population along the pipeline route.

**TABLE 8.3-1
Developable Residential Parcels in Bolton
Along Potential MDC Interconnection Scenario #4A**

Access Point	Number of Parcels	Total Acres	Potential Population*
Bolton Center Road	1	17.0	44
Campmeeting Road	1	84.0	218
Carpenter Road	2	51.6	132
Iroquois Trail	2	5.0	13
Wall Street	2	29.3	75
Total	8	186.9	482

*Assuming subdivision into one-acre lots with an average household size of 2.60

Development in the vicinity of Interstate 384 would likely not change existing household sizes although mixed-use developments along Route 44 could have some effect. Additional residential development in Bolton would provide additional housing opportunities.

Town of Coventry

The Town of Coventry appears to desire additional but limited commercial development along Route 44. This development could spur residential development in the community by making the town a more attractive place to live and work. In addition, several residentially zoned parcels are located adjacent to the potential water main under routing scenario #4A. The presence of the water main is expected to enable the Town of Coventry to allow specific types of residential and commercial developments in this area. Thus, the total population in Coventry could increase if routing scenario #4A were selected.

Table 8.3-2 presents the potential developable areas immediately adjacent to Route 44 and the potential population that could result from such development. Parcels without extensive undeveloped areas and those including floodplains, commercially and agriculturally zoned areas, conservation easements, and existing functional open space (such as that owned by the University) are not included. 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.).

The pipeline under routing scenario #4A passes residentially developable parcels that if developed could increase the population of Coventry by more than 400. However, this level of residential density could be achieved under existing zoning without the regional pipeline. The presence of a public water supply pipeline may or may not make these areas more attractive to development. 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 other types of development that could reduce the potential population along the pipeline route.

**TABLE 8.3-2
Developable Residential Parcels in Coventry
Along Potential MDC Interconnection Scenario #4A**

Area	Zoning	Number of Parcels	Total Acres	Potential Population*
West of Route 31	GR-80	2	4.5	5
Route 44 / Route 31	GR-80	3	17.5	20
West of North River Road	GR-40	1	6.3	15
	GR-80	1	13.5	15
East of North River Road	GR-40	5	93.4	240
	GR-80	6	92.2	119
Total		18	227.4	414

* Assuming subdivision into one-acre lots (GR-40) or two-acre lots (GR-80) with an average household size of 2.59

Routing scenario #4B passes along the Route 195 corridor in northeastern Coventry (pipeline segments 11 and 12A). An analysis of this area is presented in Section 7.2. As noted in that analysis, minimal impact on demographics would occur in that area from the presence of a new water main. This is because the only developable parcels not located within the 1% annual chance floodplain are within a Special Planning Area zoned neighborhood commercial.

Town of Mansfield

An overlay zone as proposed by Mansfield, in combination with the RAR-90 zoning present throughout the potential pipeline route areas, will restrict the development density associated with this alternative. However, effects to demographics are expected in Mansfield due to the presence of additional water supply. Table 8.3-3 presents the 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. Storrs Center and development in other areas of Mansfield are also not included. 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 8.3-3
Developable Residential Parcels in Mansfield by Pipeline Segment
Along Potential MDC Interconnection Scenarios**

Pipeline Segment	Number of Parcels	Total Acres
2	0	0
4	0	0
5	3	22.8
6	2	18.7
12A	2	9.9
13	3	166.8
15	3	49.3
16	0	0
17	1	4.1
18	2	28.8
20	0	0
21	0	0

As noted in Table 8.3-3, some pipeline segments pass residentially developable parcels that could impact demographics. Table 8.3-4 compares the developable areas to the potential pipeline scenarios. Note that 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 8.3-4
Potential Developable Areas Along MDC Pipeline Scenarios**

Routing Scenario	Number of Parcels	Total Acres	Potential Population*
#4A	7	70.3	170
#4B	10	245.9	597

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

Based on the figures in Table 8.3-4, the total population of Mansfield could increase by either 170 or 600 under the two MDC interconnection scenarios. 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, the population figures above do not account for potential mixed-use housing in Mansfield Four Corners, which would potentially be part of the 0.17 mgd water demand to be realized over the 20-year planning period. This development would not likely change existing household sizes but could provide additional housing opportunities.

Town of Manchester

Demographics in the Town of Manchester are not expected to be affected by the MDC alternative as this area is already served by public water supply from the Manchester Water & Sewer Department. Section 6-3 of the MDC Charter indicates that MDC will not sell water in competition with Manchester [who holds the Exclusive Service Area (ESA) for the entire town]. Thus, any sale of water in Manchester would be performed either directly to the Manchester system or via an agreement with Manchester. It does not appear that Manchester has a need to identify additional supply sources now or in the foreseeable future. However, the Water and Sewer Department may wish to develop an interconnection with MDC to provide a backup source of supply to their higher service areas.

Towns of South Windsor and Vernon

The provisions of Sections 5-8 and 6-3 of the MDC's Charter can be interpreted to indicate that while MDC may sell water to individual customers, municipalities that operate water systems, and state agencies, the Charter does not specifically empower the MDC to sell water to a private water company or encumber its assets through agreements with a private water company. Therefore, this Environmental Impact Evaluation (EIE) assumes that MDC will not develop new wholesale agreements with CWC in South Windsor and Vernon although emergency interconnections that do not encumber MDC's supplies may still be warranted. Furthermore, CWC is able to service any new developments within its ESA. As such, it is very unlikely that MDC will supply any additional water supply to South Windsor or Vernon to the extent that demographics in these towns would be affected by this alternative.

Town of Tolland

As routing scenario #4B crosses a similar area of Tolland as the CWC alternatives, the analysis presented for Tolland in Section 7.2 is also applicable to routing scenario #4B for areas south of Interstate 84 on Route 195. This analysis realized relatively minimal impacts to demographics from a potential pipeline through the area.

In addition, areas located adjacent to Interstate 84 must also be considered. 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 *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. This development would not likely change the existing household size in the area but could provide additional housing opportunities.

8.3.2 ECONOMY AND EMPLOYMENT

As this alternative can provide the amount of water necessary for the University to meet its committed water demands, the local and regional labor force will benefit from the construction of Storrs Center, expansion of North Campus, and the eventual redevelopment of the Depot Campus. This benefit would include both construction jobs as well as jobs created at these facilities.

Mansfield Four Corners would be redeveloped and provide additional jobs in this area. The Neighborhood Business area at the intersection of Route 195 and Route 32 would directly benefit from the availability of water supply for routing scenario #4B as the pipeline would run directly through this area. The commercial development in the northeast corner of Coventry could be connected to public water supply and would provide additional jobs.

A benefit would be realized by the Towns of Bolton and Mansfield in terms of increased tax income over existing levels since several existing and proposed projects could continue development. This type of benefit may minimally be realized in the Towns of Coventry and Tolland. The increase in property values and the overall tax base could be detrimental to low income populations, but the percentage of these populations is relatively small (seven percent or less) throughout the majority of the pipeline segments, and new development would be concentrated in planned development areas.

In total, this alternative has the potential to provide a significant 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 in Bolton, Coventry, Tolland, and Mansfield to restrict development along the applicable pipeline.

8.3.3 EXISTING WATER RATES

Property owners immediately adjacent to a pipeline from MDC 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, MDC could provide water service to properties located adjacent to its water main in Bolton, Tolland, Coventry, and Mansfield dependent upon the selected routing. The only exception would be in areas of Route 195 currently served by the Town of Tolland. Routing to Mansfield Four Corners would be performed via a distribution main in the Technology Park (pipeline segment 21) and a distribution main extended along Route 44 (pipeline segment 20).

MDC water rates for individual customers (based on 72,000 gallons of annual use at existing water rates) would be \$549 per residential connection and \$549 per commercial connection. This is a higher cost than the water rates in the University system (\$393 per year for a similar water usage).

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.

8.3.4 PROPERTY OWNERSHIP AND EMINENT DOMAIN

As MDC is not proposing the use of any new water sources in the short term, and the majority of construction work will take place within the easement of roadways, 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:

- 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 5 or 12A).

Construction period impacts to property ownership are not expected, and no mitigation is proposed.

8.4 COMMUNITY FACILITIES AND SERVICES

The community facilities and services along the 16 potential pipeline segments associated with the two MDC interconnection scenarios are summarized in Table 8.4-1 and presented in more detail in the following sections.

8.4.1 EDUCATION

Regardless of the MDC interconnection scenario selected, 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 8.4-1 below, several schools exist along potential pipeline segments associated with the MDC alternative. This includes Sunset Ridge elementary school in East Hartford (already served by MDC), Manchester Community College (already served by Manchester), and the Depot Campus (already served by the University). The installation of a new water main would not provide the opportunity to provide water supply to adjacent facilities. However, access to the elementary 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.

TABLE 8.4-1
Summary of Community Facilities and Services
by Pipeline Segment Along MDC Interconnection Routes

Pipeline Segment	School?	Potential Benefit from Fire Protection?	Recreation Area?
1	Yes	Already served by MDC	Yes
2 – Manchester	Yes	Already served by Manchester	Yes
2 – Bolton	No	Residential, Commercial, and Industrial	Yes
2 – Coventry	No	Residential and Commercial	Yes
4	No	Residential and Commercial	No
5	No	Residential	No
6	Yes	Residential (excludes areas already served by the University)	Yes
7 – Manchester	No	Already served by Manchester	No
7 – South Windsor	No	Already served by CWC	No
7 – Vernon	No	Residential (excludes areas already served by CWC)	No
7 – Tolland	No	Residential	Yes
9	No	Already served by Tolland	No
10	No	Already served by Tolland	No
11	No	Residential	Yes
12A	No	Commercial	No
13	No	Residential	No
15	No	Residential	No
16	No	Residential	No
18	No	Residential and Commercial	Yes
20	No	Residential and Commercial	No
21	Yes	Will be served by the University	Proposed

Indirect impacts to education are possible. As additional population growth could be expected to some degree from this alternative, additional students could be recognized in Bolton, Coventry,

and Mansfield for routing scenario #4A, and in Tolland and Mansfield for routing scenario #4B. The potential number of new students in Coventry is believed to be minimal under routing scenario #4B. The influx of students may require the hiring of additional faculty or staff as well as potentially requiring expansion of facilities. These educational expenses could potentially be offset by the additional taxes collected on the developed and redeveloped properties in these communities.

8.4.2 PUBLIC SAFETY AND EMERGENCY SERVICES

The primary benefit to fire protection associated with this alternative is that a regional pipeline could provide a large quantity [more than 1,000 gallons per minute (gpm) for two hours] of water for fire flows at locations along each pipeline route. This would provide a benefit to Coventry, Mansfield, and potentially Bolton and Tolland, depending on the routing scenario chosen. Manchester, South Windsor, and Vernon already benefit from fire protection service from public water supplies. Table 8.4-2 presents a comparison of the potential number of new hydrants that could be installed along the two MDC routing scenarios.

**TABLE 8.4-2
Potential Fire Protection Benefits from MDC**

Routing Scenario	Distance (feet)*	Number of Hydrants
#4A	51,430	103
#4B	25,300	51

* 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, nor areas along Interstate highways

Routing scenario #4B 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.

A fire flow of 1,000 gpm for two hours is equivalent to 0.12 million gallons (MG). Fire flows under this alternative would be met through the use of fire pumps installed at pumping stations under this alternative as well as nominal storage tanks along the pipelines proposed for this alternative.

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

Extension of public water service could have an indirect effect on public safety and emergency services similar to that of education. The additional population could represent a marginal increase in police, fire, and emergency services due to the increased population and coverage area. Additional taxes collected on newly developed and redeveloped properties may partially or fully offset any additional expenditure.

8.4.3 PARKS AND RECREATION

Town of Bolton

Recreational facilities in Bolton along pipeline segment 2 (routing scenario #4A) include Bolton Notch State Park, the greenway near Bolton Notch State Park, and the boat launch to Lower Bolton Lake. In particular, pipeline segment 2 utilizes the access road to Bolton Notch State Park and a portion of the greenway adjacent to Route 44 / Route 6 / Interstate 384. These recreational facilities do not require public water service although the introduction of a water main in the area may allow for minimal trailside use or fire protection. Construction activities in the area of Bolton Notch will temporarily impact access to the greenway and the park; this impact is expected to be minor as trail usage may need to be temporarily suspended. Construction activities along Route 44 would temporarily limit access to the boat launch; this impact is expected to be minor.

Town of Coventry

Parks and recreational facilities in Coventry along routing scenario #4A include a golf course open to the public, a private hunting club, and conservation easements maintained by the Town of Coventry. The golf course and the hunting club are served by private water supplies. It is possible that they may wish to connect to public water service. Parks or recreational areas do not currently exist in Coventry along Route 195. Therefore, impacts to parks and recreation from routing scenario #4B would not occur in Coventry.

Towns of East Hartford and Manchester

Several parks and recreational facilities are located along the potential MDC pipeline segments in East Hartford and Manchester. These include fields and educational facilities as well as several town parks in Manchester. Each of these facilities is already served by public water. Construction period impacts to these facilities are not expected since they are not directly accessed from Interstate 384.

Town of Mansfield

A few parks and recreational facilities are located in Mansfield along the potential pipeline routes. Recreational areas are present in the vicinity of the Depot Campus (pipeline segment 6) including multiuse playing fields and state-owned land leased to the Town of Mansfield as part of Shelter Falls Park. The Villa Hills Golf Course (pipeline segment 18) is a privately owned nine-hole golf course open to the public. This facility is 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 under routing scenario #4A near the golf course. Other recreational areas are not expected to be impacted during the construction period.

Towns of South Windsor and Vernon

Potential pipeline segment 7 does not appear to pass adjacent to any parks or recreation facilities in South Windsor or Vernon. As such, impacts to any facilities in these communities are not expected.

Town of Tolland

Crandall Park is the largest public park in Tolland and is over 400 acres in size. It is located on Cider Mill Road just north of Interstate 84. This facility includes a swimming area, sports fields and courts, hiking trails, a pavilion, and a lodge. This facility is served by an on-site water supply. Only one recreational facility exists in Tolland along pipeline segment 11. This is the former Dimock property in the southeastern corner of Tolland that is now dedicated open space and used for passive recreation.

Construction activities are not expected to impact these facilities, nor are they expected to be served by public water supply.

8.4.4 PUBLIC TRANSPORTATION

A slight benefit to public transportation would be realized under this alternative. The creation of educational and research facilities on North Campus and the Depot Campus would 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. However, routing scenario #4A could lead to additional bus stops in Bolton due to the expansion of commercial activities along Route 44.

An impact to public transportation will be realized during construction due to traffic delays dependent on the amount of pipeline being installed along existing major bus routes. However, since the majority of the proposed pipelines are to be installed far from areas currently serviced by the University or WRTD, only a minimal impact to public transportation is expected.

8.5 AESTHETIC AND CULTURAL RESOURCES

The potential interconnection routes with MDC include several communities. Potential project activities in the town of East Hartford would occur in areas already served by MDC such that impacts to aesthetic and cultural resources would be minimal and only occur during the construction period. As potential project activities will take place within interstate highways or in roadway easements within Manchester, South Windsor, and Vernon, impacts to aesthetic and cultural resources are also expected to be minimal in these communities and limited to visual impacts during the construction period. The potential impacts to aesthetic and cultural resources in Bolton, Coventry, Mansfield, and Tolland are described below.

Town of Bolton

Development density is very light along the Interstate 384 portion of Bolton and increases to light density along Route 44. Some moderate- to high-density housing is present in the vicinity of Lower Bolton Lake, which is a significant aesthetic and visual resource in addition to being a recreational resource. The potential pipeline also passes areas adjacent to and partially within Bolton Notch State Park and the nearby greenway. These are also aesthetic and visual resources in addition to being recreational resources, and Bolton Notch is a particularly memorable vista for travelers along Interstate 384/Route 44/ Route 6.

According to the Bolton *Plan of Conservation and Development*, several historic properties are located along Route 44 as is the Quarryville Cemetery. The State Archaeologist, the State Historic Preservation Officer, and the Bolton Historical Society would be consulted prior to beginning work in these areas. The extension of public water service past these properties will not impact the historic nature of these properties.

Cultural resources include the Bolton United Methodist Church and the Saint George Episcopal Church. The two churches are supplied by private wells and may wish to connect to the water main, especially if they are classified as public water systems. They would also benefit from public water supply for fire protection purposes.

Construction-related impacts to aesthetic and cultural resources in Bolton are expected but will be temporary. The nature of roadway construction requires a high amount of visibility for safety purposes. As such, no mitigation is proposed.

Town of Tolland

The 2010 Tolland *Plan of Conservation and Development* has identified a primary greenway along the Willimantic River as well as along Chapin Meadow Brook, Skungamaug River, and Paulk Hill Brook. The plan further identifies scenic views along Interstate 84 and notes that the Benton Homestead (a historic site) is located on the south side of Interstate 84 on Metcalf Road. As water mains will be installed beneath the ground, impacts to aesthetics in Tolland are only expected during the construction period.

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 and is potentially already served with public water. Other aesthetic or cultural resources do not appear to be located along Route 195 in Tolland.

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.

Town of Coventry

Several areas of aesthetic and cultural value are identified along the Route 44 corridor (routing scenario #4A). Scenic vistas are identified near Cedar Swamp Road Extension and Silver Street, and the Glass Factory Historic District (including the Turner House owned by the Museum of Connecticut Glass) has been identified near North River Road. Several historic homes, the Brick

School House, and the Brigham Tavern are also located in this corridor. The extension of public water service past these properties will not impact the historic nature of these properties.

Modern houses of worship include the Second Congregational Church and the Presbyterian Church of Coventry. These facilities are currently served by private wells and may wish to connect to the water main, especially if they are classified as public water systems. They would also benefit from public water supply for fire protection purposes.

Potential pipeline routes in Coventry under routing scenario #4B include Route 195. 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 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 MDC 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. Some areas are undeveloped, featuring forests with little understory or large open wetlands such as near Shelter Falls Park.

Mansfield's 2006 *Plan of Conservation and Development* further identifies areas of archaeological sensitivity, historic site areas, and prehistoric site area in Mansfield. Areas of sensitivity are located along potential pipeline segments 4, 5, 6, 12A, and 13. Prehistoric site areas are identified along Route 195 along pipeline segments 5 and 20. The Mansfield Training School Memorial Grove is located adjacent to pipeline segment 6, and the Tilden Cemetery is also located adjacent to pipeline segment 12A. The State Archaeologist and the State Historic Preservation Officer will be consulted prior to beginning work in these areas as well as the Mansfield Historic District Commission and the Cemetery Committee.

Mansfield Four Corners is considered a historic village and is located at the terminus of 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 MDC 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. Other historic districts include Mansfield Depot and the former Mansfield Training School (routing scenario #4A).

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

As new water mains will be installed within existing roadways, long-term impacts to aesthetic and visual resources are expected to be minimal. Coordination with the various related commissions and committees in the Town of Mansfield will be essential to a successful project. Construction-related impacts to aesthetic and cultural resources in Mansfield are expected but will be temporary. The nature of roadway construction requires a high amount of visibility for safety purposes.

8.6 PUBLIC WATER SUPPLY

8.6.1 EXCLUSIVE SERVICE AREAS

The MDC interconnection is the only alternative evaluated in this EIE that would traverse through an existing ESA established by the Water Utility Coordinating Committee (WUCC). Provision of water from the MDC system in East Hartford through Manchester, South Windsor, and Vernon is not consistent with the prior establishment of ESAs in these towns. Thus, there are two questions relative to an MDC interconnection to extend water mains along I-84 or I-384: (1) Is the action permissible?; and (2) Are WUCC approvals needed?

As written, the statutes and regulations discourage actions such as the MDC interconnection because it would lead to the installation of water mains carrying treated, potable water where public water service is already available. The proposal is counter to CGS 25-33(c), which requires maximizing "*efficient and effective development of the State's public water supply systems*" and CGS 25-33(g)(b), which recommends the consideration of "*orderly and efficient development of public water supplies*." The interconnection is also counter to Regulations of Connecticut State Agencies (RCSA) Section 25-33h-1 (d)(2)(B)(i)(cc), which obligated the appropriate forethought in the establishment of the ESAs in Manchester, South Windsor, and Vernon. MDC participated in the WUCC meetings that established these ESAs.

Although the proposed main extensions through existing ESAs are discouraged by the statutes and regulations, the main extensions are not prohibited. RCSA Section 25-33h-1(k)(3) states that "*No public water supply system may be approved within a public water supply management area after the commissioner has convened a WUCC unless an existing public water supply system is unable to provide water service or the WUCC recommends such approval*." Pursuant to this part, the Upper Connecticut River WUCC must recommend and approve an MDC main extension through Manchester and potentially South Windsor and Vernon. This could occur only through a scheduled meeting of the Upper Connecticut River WUCC including a discussion and vote of the members of the WUCC. The WUCC includes the MDC as well as the water utilities that hold the ESAs that would be traversed (CWC and the Town of Manchester Water and Sewer Department) as members.

8.6.2 NON-UNIVERSITY AND TOWN OF MANSFIELD DEMANDS

While potential demands at the University and Mansfield Four Corners are well defined, MDC has not estimated the potential demands in other areas that may be realized through an interconnection with the University. As such, the potential population increases estimated in Section 8.3 have been utilized to determine potential additional demands through the long-term planning period. As these demands are primarily residential, the Connecticut DPH per capita standard of 75 gallons of water per person per day has been utilized to estimate demands.

Routing scenario #4A would direct water through East Hartford, Manchester, Bolton, Coventry, and Mansfield from the MDC system in East Hartford. Potential demands in East Hartford and Manchester are expected to be negligible since East Hartford is already served by MDC and because Manchester will likely only utilize an emergency interconnection with MDC. Potential minimum demands in Bolton and Coventry are presented in Table 8.6-1.

TABLE 8.6-1
Summary of Minimum Cumulative Water Demands on the MDC System
from New Developments Along Routing Scenario #4A

Area	ADD (mgd)	MMADD (mgd)	PDD (mgd)
Bolton	0.04	0.05	0.07
Coventry	0.03	0.04	0.05
Total	0.07	0.09	0.12

Note: A peaking factor of 1.31 for MMADD and 1.70 for PDD has been assumed.

Routing scenario #4B would direct water through East Hartford, Manchester, South Windsor, Vernon, Tolland, Coventry, and Mansfield from the MDC system in East Hartford. Potential demands in East Hartford, Manchester, South Windsor, and Vernon are expected to be negligible since East Hartford is already served by MDC and because the remaining areas are within the ESA of other water utilities. Potential demands in Tolland and Coventry are expected to be minimal similar to those estimated under the CWC interconnection alternative in Section 7 excepting a potential interconnection with the Town of Tolland water system.

Routing scenario #4A could directly interconnect with the Depot Campus water system and provide system redundancy. Additional demands could also be realized related to small community and non-community water systems that may wish to connect to the system and other areas of Mansfield that may benefit from the availability of public water service. These potential demands are discussed in the following section.

8.6.3 OTHER PUBLIC WATER SYSTEMS

Additional areas of potential water need are located along potential MDC pipeline routes. These are identified as follows:

- The Town of Tolland operates a water system along Route 195 between Interstate 84 and Anthony Road. Projections in the Tolland *Water Supply Plan* indicate that the Tolland system may have difficulty meeting its projected water demands in the future. The Town of

Tolland could potentially be interested in purchasing water from MDC to meet its current and future demands while maintaining a MOS of 1.15.

- Norwegian Woods Apartments in Tolland is served by two wells and requires iron and manganese removal. The 2002 Mansfield *Water Supply Plan* notes that this system has had bacteria issues. This apartment complex could potentially wish to connect to the water main. It has a reported water demand of 18,000 gpd. The Town of Tolland has been planning to serve this development in the long term.

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 Twin Hills Water District in Coventry serves the Twin Hills Drive subdivision in western Coventry. Based on information from Connecticut DPH, this system could have a water demand of 12,000 gpd. This system may wish to interconnect with MDC for the purposes of system redundancy.
- The General Water Division in Coventry located in the vicinity of Northfield Road is owned by CWC. It has a water demand of approximately 24,000 gpd. This system may interconnect with MDC for the purposes of system redundancy. As part of this system is located on Route 44, the MDC pipeline would pass through this system's service area.
- The Pilgrim Hills system in Coventry is located in the vicinity of Mark Drive and is owned by CWC. It has a water demand of approximately 15,000 gpd. This system may wish to interconnect with MDC for the purposes of system redundancy.
- The Stone Pond Condominiums in Tolland is currently located near the Tolland water system but is not connected. The 2002 Mansfield *Water Supply Plan* noted that this system has only one well and requires iron and manganese removal. An MDC 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 operated by CWC and had excellent water quality as of the 2002 Mansfield *Water Supply Plan*. This system is likely to interconnect with an MDC pipeline if available, but the wells could remain in service.

Finally, several small non-transient non-community (NTNC) and transient non-community (TNC) systems were identified in Section 4 of this document. Several of these systems lie along potential pipeline segments associated with an MDC interconnection:

- Several small systems located along pipeline segment 2 in Bolton, Coventry, and Mansfield are unlikely to connect since they are not located in areas with contamination of groundwater. However, these businesses would benefit from fire protection from a nearby water main.
- Existing systems along pipeline segments 8, 9, and 10 are unlikely to connect to the water system since they are already in an 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.
- 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.

Table 8.6-2 summarizes the likely incremental demands from small water systems.

TABLE 8.6-2
Summary of Minimum Cumulative Water Demands on the MDC System
from New Developments Along the Two Routing Scenarios

Routing Scenario	ADD (mgd)	MMADD (mgd)	PDD (mgd)
#4A	0.63	0.71	1.21
#4B	0.91	1.16	1.89

8.7 OTHER PUBLIC UTILITIES AND SERVICES

8.7.1 SANITARY SEWER

Farmington River

The Farmington River is dependent on runoff, base flow, and tributary flows to help dilute treated wastewater effluent. The river receives wastewater discharges from numerous public and private sources. The principal discharges are from municipal sewage treatment plants located in New Hartford, Canton, Farmington, Simsbury, and Windsor. Additionally, there are sewage treatment plants on Farmington River tributaries including the Winsted plant on the Still River and the Bristol and Plainville plants on the Pequabuck River. The high level of wastewater treatment enables the Farmington River to maintain a relatively high water quality that helps support extensive recreational activity.

Based on the findings from the Farmington River Instream Flow Study, the river has adequate capacity to assimilate wastewater under minimum flow conditions. Furthermore, the Farmington Wild and Scenic Study commented on Goodwin Dam flow needs for wastewater assimilation as follows:

"Based on the results of the DEP's waste load allocation studies for the Farmington, the minimum flow of 50 cfs mandated by State statute was assumed to be adequate to meet the standards for Class B water quality classification."

The 1988 CT DEEP (then DEP) waste load allocation report stated the following:

1. Flow levels under the worst case scenario are adequate to assimilate existing discharges without any violations of Class B standards, i.e., the minimum required release of 50 cubic feet per second (cfs) is sufficient to maintain Class B levels with existing discharges.
2. At extreme low flows, even the maximum proposed discharges from both the Farmington and Simsbury sewage treatment plants would not violate the Class B dissolved oxygen standard if they maintained normal secondary treatment.
3. In order to meet the stricter water quality standards for ammonia required for Atlantic salmon, the Farmington sewage treatment plant will have to provide advanced (tertiary) treatment.
4. The use of chlorine for disinfection of the increased Farmington sewage treatment plant discharge could violate standards and, therefore, another technique such as ultraviolet light or dechlorination equipment will be necessary.

Subsequent to the 1988 waste load allocation report, the Farmington treatment plant modifications were made. The water quality data provided earlier supports the conclusions that the river has been assimilating wastewaters.

Given that the MDC would continue to make releases from its two supply sources in the Farmington River basin above 50 cfs, impacts to wastewater assimilation along the Farmington River are not expected.

Project Towns

Sanitary sewer service is available coincident with public water service in East Hartford, Manchester, South Windsor, and Vernon. As the extension of MDC water service through these areas is not expected to create additional customers, no impact to sanitary sewer service is expected in these communities. However, existing sewer mains would need to be avoided during construction.

The Bolton Lakes Regional Water Pollution Control Authority (BLRWPCA) is currently installing sewer service along Route 44 and in the vicinity of Bolton Lake in Bolton. The Town of Bolton is expecting that the presence of a sewer main will help promote commercial and industrial development in the area and is believed to have considered such additional flows with its sewer agreement with the Town of Manchester.

Impacts are not expected to the Coventry Water Pollution Control Facility (WPCF) or sewer system as there is no sewer service on the Route 44 or the Route 195 corridor. 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 Town of Coventry appears to be promoting the use of community septic fields instead of extension of sewer service. While Special Planning Area 1 is located adjacent to the sewer system being constructed in Bolton, this area is zoned commercial and agricultural such that large-scale developments with significant wastewater flows are not expected.

While a few potential new developments and homes could be realized in western Tolland, the density of these developments is not expected to be significant. Additionally, such areas would not need to connect to the sewer service in Tolland. Impacts are not expected along Route 195 in Tolland in areas that do not have sewer service since development density will also be restricted by the proposed overlay zone along the potential pipeline route.

The proposed overlay zones in Mansfield would 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.

8.7.2 STORMWATER SYSTEMS, BRIDGES, AND CULVERTS

A variety of bridges, cross culverts, and stormwater systems can be found along the potential pipeline segments associated with the interconnection scenarios with MDC. Table 8.7-1 summarizes these watercourse crossings. Photographs of several of these crossings are presented in Appendix C.

TABLE 8.7-1
Summary of Stormwater Systems by Pipeline Segment
Along Potential MDC Interconnection Routes

Pipeline Segment	Bridge	Storm Drainage Systems	Cross Culverts	Comment
1	None	Yes	Yes	Unnamed tributary near Sunset Ridge school
2	Birch Mountain Brook, Skungamaug River, Willimantic River	Yes	Yes	May need to hang pipe on side of Skungamaug bridge or directionally drill. Several large box culverts also may require the above.
4	None	No	None observed	
5	None	No	None observed	
6	Nelson Brook	Yes	Yes	May need to hang pipe on side of Nelson bridge or directionally drill
7	Hockanum River (2x)	Yes	Yes	May need to hang pipe on side of bridges or directionally drill. Paulk Hill Brook crossing in Tolland will be challenging.
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.
13	None	Swales	Yes	Intermittent stream
15	None	No	Yes	Several intermittent streams
16	None	Route 44	Yes	Localized drainage system
18	Cedar Swamp Brook	Yes	None observed	Bridge has existing utility crossing. Nearby pedestrian bridge could also be used to cross.
20	None	Yes	Yes	Nearby pedestrian bridge
21	None	Future	Future	Future North Hillside Road extension

The major crossings affecting routing scenario #4A include bridges at Birch Mountain Brook, the Skungamaug River, and the Willimantic River. A pipe could be hung on the side of these bridges if enough clearance above the bridge is not available beneath the roadway, or directional drilling could occur beneath the riverbed. The height of the bridge relative to the base flood elevation could be an important factor. The bridge at Cedar Swamp Brook has an existing utility crossing; a pedestrian bridge nearby may present a better option for hanging a pipe if directional drilling is to be avoided.

The major crossings affecting routing scenario #4B include multiple bridges at the Hockanum River and bridges at Paulk Hill Brook, the Skungamaug River, and the Willimantic River. The crossing of Cedar Swamp Brook would also be a challenge as discussed above. A pipe could be

hung on the side of these bridges if enough clearance above the bridge is not available beneath the roadway, or directional drilling could occur beneath the riverbed. The height of the bridge relative to the base flood elevation could be an important factor. The bridge at Cedar Swamp Brook has an existing utility crossing; a pedestrian bridge nearby may present a better option for hanging a pipe if directional drilling is to be avoided. These are design issues that can affect the project cost but should not impact the viability of the stormwater infrastructure.

Many minor crossings would also affect construction. Folly Brook, Gages Brook, Chapins Meadow Brook, Bolton Notch Brook, Ash Brook, Olsen Brook, and Coventry Brook could present construction-related challenges, as could smaller shallow culverts beneath roadways. Water main and pump station installations would be designed to avoid interference with existing stormwater systems. If modifications to stormwater systems were necessary, they would be evaluated in the design process.

New stormwater systems would meet the University's design standards. Such stormwater systems would be evaluated through state permitting requirements. Drainage systems associated with new development in the remaining communities would be evaluated through local and potentially state permitting processes.

8.7.3 ENERGY, ELECTRICITY, AND NATURAL GAS

The proposed interconnection with MDC would result in the following additional energy demands over current levels:

- Additional energy demands at the MDC treatment facilities for water treatment
- Additional energy demands for pumping stations
- 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 MDC operations and maintenance personnel
- Additional energy demands (electricity, fuel) from new development and redevelopment spurred by the presence of the water main
- Additional energy demands from additional pumping at potential new wellfields in Glastonbury

Energy demands in the Technology Park are addressed in the Final Environmental Impact Statement (FEIS) and will continue to be addressed in the Comparative Evaluations for Technology Park buildings.

Electrical Service

As noted above, incremental electrical demands will be realized by MDC to support this project. These include using electricity for treating additional water at MDC treatment facilities, additional pumping station demands to direct water into Mansfield, and potentially increased electrical demands from additional personnel and equipment.

MDC's engineering consultant estimated the energy demand in terms of total pump lift in feet and in power required in kilowatts (kW) to transfer 3.0 mgd of water through a pipeline from East Hartford to Mansfield. These figures are presented in Table 8.7-2.

**TABLE 8.7-2
Potential Energy Use for MDC to Transfer Water at 3.0 mgd**

Routing Scenario	Pipeline Diameter	Total Pump Lift (feet)	Estimated Power (kW)*	Potential Cost per Year**
#4A	16-inch	809	476	\$11,600
#4B	16-inch	854	502	\$12,230

* Assuming a wire-to-water efficiency of 70%

** Assuming a 16-hour pumping day and a \$0.1 per kW-hour power cost, as reported by Tighe & Bond

Electrical service would also be extended into any new developments including those spurred by the presence of a regional water main. New University buildings would partially or fully be serviced with electricity from the Main Campus Central Utility Plant (CUP). As building metrics 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

Expansion 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 that sufficient supply exists to serve these developments. In addition, natural gas usage to create electricity at the CUP may increase to support proposed University development.

Coordination with these utilities will be necessary to determine the depth of the 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

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

8.7.4 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, 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.

8.8 TRAFFIC, PARKING, AND OTHER TRANSPORTATION

The potential interconnection with MDC may have several impacts related to parking, traffic, and other transportation. Table 8.8-1 presents the characteristics of roadways along potential pipeline segments associated with the MDC interconnection scenarios. The majority of these routes are well traveled roadways.

TABLE 8.8-1
Traffic Characteristics Along Potential MDC Pipeline Segments

Pipeline Segment	Distance (feet)	Road Type	Traffic Count	Speed Limit (mph)	Source
1	7,980	Arterial	17,100	35	2010 CTDOT
2	78,060	Interstate / Arterial	58,400*	40 - 65	2010 CTDOT
4	840	Arterial	6,900	30	2010 CTDOT
5	1,890	Arterial	6,900	30	2010 CTDOT
6	7,690	Arterial	6,600	35	2010 CTDOT
7	75,260	Interstate	120,000**	65	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
13	1,630	Arterial	11,500	50	2010 CTDOT
15	4,560	Local	1,900	30	1998 Town of Mansfield
16	330	Arterial	7,400	40	2010 CTDOT
18	4,120	Arterial	7,400	40	2010 CTDOT
20	1,540	Arterial	9,000	40	2010 CTDOT
21	3,400	Future Collector	-	N/A	-

* Maximum of 58,400 cars per day on I-384 in western Manchester; decreases to 6,900 near Mansfield boundary

** Maximum of 120,000 cars per day on Interstate 84 near East Hartford; decreases to 59,500 near Exit 68

The pipeline from MDC has the potential to cause traffic impacts along the Route 44 or Route 195 corridor during the construction period. Construction in most areas would be constrained to one lane, resulting in alternating one-way traffic along most of the potential pipeline connection routes. These delays could also impact bus service in the area. State Police traffic protection would be required. Construction activities may also temporarily restrict access to businesses and homes. Bikeways and sidewalks in the vicinity of the University (such as along Route 44) may need to have portions temporarily closed during the construction period. In addition, performing construction work during the summer period would minimize the volume of traffic passing the construction area near the University.

Traffic impacts along the interstate highways will be less significant than impacts along other state roads since much of the work will occur within the breakdown lane or the High-Occupancy Vehicle (HOV) lane median. The length of interstate highway along routing scenario #4B is much greater than that along routing scenario #4A. While utilization of routing scenario #4B would result in less traffic impacts along arterial state roads, it would result in a longer construction time as the Connecticut Department of Transportation (CTDOT) would likely restrict construction timing along the interstate to coincide with off-peak flows of traffic.

Local roads will be minimally utilized under routing scenario #4B, and not utilized at all under routing scenario #4A. Local police traffic protection would be required. Efforts will be made during the construction period to not restrict access to homes and businesses any more than necessary should scenario #4B be chosen.

The New England Central Railroad in western Mansfield would need to be crossed at different locations 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.

8.9 WETLAND RESOURCES

An interconnection with MDC 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 the current MDC supply sources. These are described in the following sections.

8.9.1 EXISTING WETLAND AREAS ALONG POTENTIAL MDC PIPELINE SEGMENTS

The potential pipeline segments associated with an interconnection with MDC pass a variety of wetlands and watercourses. Refer to Figure 8.9-1 and Figure 8.9-2 for a depiction of inland wetland soils and watercourses adjacent to potential pipeline segments. Table 8.9-1 summarizes the wetlands found along each pipeline segment for the potential MDC interconnection. These are described in more detail below.

- Pipeline Segment 1: The intermittent watercourse has a riparian zone adjacent to an open field that provides some wetland habitat. While the forested wetland west of Phillips Farm Road has some habitat value, the wetland across from Veterans Memorial Park has a small pond with a shrub and emergent wetland bordering it. The pond may support warm-water species of fish. The associated wetlands are diverse and provide good habitat despite the presence of invasive species. Flood control and groundwater interaction are other wetland functions and values.

TABLE 8.9-1
Wetlands along Potential MDC Pipeline Segments

Pipeline Segment	Number of Adjacent Wetland Areas	Total Adjacent Wetland Distance (ft)	Comment
1	3	900	Forested wetland, intermittent watercourse
2 – Manchester	4	1,130	Forested wetland, Folly Brook, Globe Hollow Brook, Birch Mountain Brook
2 – Bolton	4	1,960	Forested wetlands, Porter Brook, Bolton Pond Brook
2 – Coventry	10	2,820	Forested wetlands, Ash Brook, forested/agricultural wetland, Olsens Brook, Coventry Brook, intermittent streams, Skungamaug River, Brigham Tavern Brook
2 – Mansfield	1	720	Willimantic River & floodplain soils
4	1	50	Willimantic River floodplain soils
5	0	0	-
6	3	240	Intermittent stream, forested wetland, Nelson Brook
7 – Manchester	3	3,820	Hockanum River & floodplain soils
7 – Vernon	4	320	Hockanum River, Clarks Brook, unnamed stream, Gages Brook
7 – Tolland	4	2,950	Unnamed stream, forested wetland / Chapin Meadow Brook, Paulk Hill Brook / Tolland Marsh Pond, Skungamaug River
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
13	2	1,675	Intermittent watercourses
15	5	985	Nelson Brook / pond outlet / wetland / two tributaries to Nelson Brook
16	0	0	-
18	2	350	Logged wetland / Cedar Swamp Brook
20	1	50	Forested wetland
21	2	420	Intermittent watercourse / wetland, vernal pool (FEIS)

- **Pipeline Segment 2 (Manchester):** Several wetlands of note are located along this pipeline segment in Manchester:
 - East of Hillstown Road there is a wet, forested depression. Dominant trees are red maple and American elm. The understory is dense with shrubs, the most common being the invasive autumn olive, which is prevalent on sandy, disturbed soils. The forest thins and becomes shrubby near the developed ball fields along Great Path Road. This mix of habitats is very good for local wildlife including songbirds and small mammals.
 - Folly Pond is located south of Route 384. It outlets to a perennial watercourse that flows beneath the highway. The riparian corridor is stable and forested. It is capable of

supporting fish and shellfish in places. Wildlife habitat is good although development fragments the corridor in several places. Dominant trees are red maple, ash, American elm, and yellow birch. Soils are sandy and uplands are dominated by oaks, hickories, and maples. The stream likely supports an underlying aquifer via the sandy soils.

- A small emergent marsh is adjacent to Route 384 near South Main Street and Mulberry Lane. Cattails, woolgrass, and other sedges were observed. The canopy is open resulting in sunny conditions. Some standing water must be present to support these obligate wetland species.
- Birch Mountain Brook flows westerly from Case Pond under Route 384 via a high bridge. The margins of the stream are forested. Water flow is ample enough to support fish and shellfish. Wildlife habitat is very good as well. Dominant trees are red maple, yellow birch and American elm. A well-developed shrub understory is present.
- Pipeline Segment 2 (Bolton): Several wetlands of note are located along this pipeline segment in Bolton:
 - Porter Brook is a mid-sized, perennial watercourse carrying flow under Route 384 from south (Sperry Pond) to north (Howard Reservoir). Flow is sufficient to support fish and shellfish, as well as providing good local wildlife habitat. Bordering vegetated wetlands appear to stabilize the banks. A minor tributary watercourse flows parallel to the highway to the west of the brook. Dominant trees are red maple, yellow birch, and American elm with a well-developed understory of shrubs and herbaceous growth.
 - Bolton Notch Pond is a large, open water body surrounded by relatively undisturbed upland forest. As such, it provides excellent fish and wildlife habitat. Parking and links to recreational trails are available. Aquatic plant growth was extensive in summer 2012 and covers a large percentage of the water surface, which is somewhat unexpected given the lack of development around the pond. Additional functions and values are pollutant/nutrient retention, aesthetic appeal and flood control.
 - Bolton Pond Brook is the perennial outlet stream from Lower Bolton Lake. It is conveyed under Route 44 via a large twin box culvert and bridge. The brook is 20-30 feet across and has a well-established forested, riparian corridor (palustrine forested wetland). Dominant trees include American elm, yellow birch, ash and red maple with a well-developed shrub understory. The perennial flow likely supports fish, shellfish and other wildlife.
- Pipeline Segment 2 (Coventry): Several wetlands of note are located along this pipeline segment in Coventry:
 - Ash Brook had a lower flow rate than Bolton Pond Brook in summer 2012 but is similar otherwise. The stream is perennial and forested with dominant trees being red maple, ash, yellow birch and American elm. The upstream area is less disturbed and the riparian corridor is intact. There is a small feeder stream parallel to the roadway on the northeast side. On the downstream side, there is an excavated pool in which many eight-inch long bass were observed. The clearing around the pool is sunny and supports many

herbaceous species such as jewelweed, ferns and sedges. The bridge carries three utility pipes across the brook. Prominent wetland attributes include fish and wildlife habitat.

- Olsens Brook at Stage Road and near Highland Market Plaza is a small stream that has been extensively re-routed and piped. There was very little flow at the time of observation in summer 2012. Still, the riparian corridor is forested upstream and downstream of the plaza providing habitat for wildlife and perhaps minor fishery habitat. The plaza clearing is sunny and the stream banks support many herbaceous species (and invasive species) useful to butterflies and other local wildlife.
- Coventry Brook is another brook with a palustrine-forested setting. Dominant trees are ash, red maple, American elm and yellow birch. The riparian corridor is well-established and many minnows were noted in the pools near the bridge. Wildlife habitat for local species is good. There are three utility pipes suspended from the bridge.
- A broad palustrine forested wetland west of Barnsbee Lane includes an intermittent watercourse. Red maple, American elm, spice bush, skunk cabbage, etc. are dominant plants. This is tributary to the Skungamaug River (discussed below). No vernal pools or other special wetland types were observed.
- The Skungamaug River is a large river system with substantial flow. There is a broad riparian corridor including bordering vegetated wetlands, especially on the western shore. The eastern banks are steeper. Dominant vegetation includes red maple, American elm, and yellow birch as in nearby settings, but riverine species such as Eastern cottonwood are found here also. Fish and wildlife support, aquifer interaction and flood protection are important wetland attributes. To the east of North River Road is a large pond that may discharge toward the river.
- An unnamed tributary to Brigham Tavern Brook flows parallel to Route 44 on the south side. Flow is eastward. Runoff from the steep ridges north of the road is carried beneath Route 44 via cross-culverts. Catch basins also discharge to the intermittent watercourse. Flow is conveyed beneath several driveways from Route 44. The area is forested but where runoff is detained by irregular grading, herbs such as skunk cabbage and Joe-Pye-Weed can be found. Drainage conveyance is the primary wetland attribute.
- Brigham Tavern Brook is a perennial stream between Route 44 and Richmond Road. It is conveyed under Route 44 via box culvert. Flow is eastward toward the Willimantic River. The stream is deeply incised in this area but there is a stable riparian corridor and the setting is forested. Local wildlife support and perhaps minor fishery habitat are wetland attributes.
- Pipeline Segment 2 (Mansfield) & 4: The Willimantic River is a large watercourse with extensive bordering vegetated wetlands. Route 44 crosses the river via a bridge. The western banks are forested and steep. The eastern banks are shallower with alluvial soils (corn fields) and floodplain. There is an oxbow of the river that converges on the northeastern bank of the bridge. Dominant trees are Eastern cottonwood, red maple, ash and American elm. Other floodplain species such as silver maple and American sycamore are likely as well. The steep

banks are dry and sandy and support oaks, hickories and maples. Fish, shellfish and wildlife habitat are important wetland attributes, as are flood control, recreation and aquifer support.

- Pipeline Segment 6: Several wetlands of note are located along this pipeline segment in Mansfield:
 - The Depot Campus has a large impoundment and marsh on the north side of Route 44. The outlet stream is culverted beneath Route 44 and a nearby area of the Depot Campus. This unnamed stream flows to the Willimantic River. Between the embankment and the roadway, there is a short section of open water that supports herbaceous wetland plants such as cattails, wool grass and Joe-Pye-Weed. These are attractive to insects but provide no other significant wetland attributes.
 - Nelson Brook (named as such on the USGS Topographic map) is labeled Weaver Brook in the field. The brook is part of a large scrub-shrub swamp and emergent marsh east of the Depot Campus. Dominant vegetation includes cattails, wool grass, Joe-Pye-Weed, steeplebush, spirea, cardinal flower, jewelweed, ferns, sedges and rushes. Red maple trees and saplings are present as are a variety of shrubs including silky dogwood, spicebush, and northern arrowwood. There is an upland knoll on both sides of Route 44 that separates two sections of the swamp. It is forested and the soils are dry supporting white pines, oaks and mountain laurel. There is also a paved pull-off with a large fill berm along the roadway. Fish and wildlife habitat, aquifer support and pollutant renovation are important wetland attributes.
- Pipeline Segment 7 (Manchester): Several wetlands of note are located along this potential pipeline segment:
 - The Hockanum River flows within a broad, cleared landscape (the remnants of the former Laurel Lake) in the interchange zone between Interstate 84 and Interstate 384. The highway and access ramps are conveyed over the Hockanum River via an elevated bridge structure. The river has been channelized through the area but the banks are stable and well-vegetated. Floodplain and alluvial soils exist broadly on the river banks. There is a large landfill and a sewage disposal facility visible to the east. There are extensive stands of the invasive *Phragmites*. Tree species are red and silver maples, weeping willow and Eastern cottonwood. Fish and shellfish habitat is present. The open fields, although degraded, still provide good wildlife habitat. The level terrain provides flood storage capacity and there is likely to be interaction with the groundwater aquifer. There are NDDB occurrences at this site.
 - A north-south oriented watercourse crosses under Interstate 84 in the vicinity of Slater Street. Poorly drained wetland soils are associated with the watercourse. There is a small pond near Catherine's Way but the stream is primarily (although narrowly) forested. The invasive species *Phragmites* is dominant around the pond. The stream and associated trees, shrubs and herbaceous growth provides a small amount of local wildlife habitat in a very heavily developed area. There may be minor fishery resources in the stream, as well as the small pond.

- The Hockanum River and an unnamed tributary are located close to Interstate 84 near Tolland Turnpike. A broad margin of floodplain and alluvial wetland soils is present along the river banks. There is a variety of wetland habitats here including palustrine forested wetlands, scrub-shrub wetlands and herbaceous, wet meadow wetlands. Commercial development presses closely upon the riverine habitat, but local and regional wildlife habitat is good. Fish and shellfish habitat are likely present in the river. Other wetland functions and values are flood storage, pollutant renovation and aquifer recharge. The tributary that crosses Interstate 84 originates at Miller's Pond in South Windsor on the north side of the highway. Warm water fish species are likely present. The surrounding woodland provides good wildlife habitat as well. There are NDDDB occurrences at this site.
- Pipeline Segment 7 (Vernon): Several wetlands of note are located along this potential pipeline segment:
 - The Hockanum River crosses under Interstate 84 from the north upstream of the Tankerhoosen River. North of the highway, the riverbanks are forested wetlands with red maple and American elm being dominant species. South of the highway, commercial development nearby has left an open canopy. Here, shrubs and herbaceous species (including invasive species such as *Phragmites*) are dominant. Floodplain and alluvial soils are present. The river provides fish and shellfish habitat. There is also flood storage and pollutant renovation potential.
 - An unnamed tributary to the Tankerhoosen River flows from the north and crosses under Interstate 84 at Exit 66. There are bordering wetlands north of the highway including areas that appear to have been filled. Undeveloped wetlands north of the highway are forested with red maple, American elm and yellow birch being dominant. South of the highway, the stream is piped under the exit ramp and South Frontage Road through open terrain. Wetland values are low here providing primarily drainage conveyance. There are NDDDB occurrences near this site farther south along the brook.
 - Clarks Brook flows from the north originating in large, mixed class wetlands. It continues southerly under Interstate 84, Baker Road and Bamforth Road. The wetlands are primarily palustrine forested wetlands, but there are pockets of shrub wetlands and some small areas of open water as well making very good local and regional wildlife habitat. Fishery resources may be present as well. Soils are poorly drained and very poorly drained with red maple, American elm, spicebush, various sedges and skunk cabbage being dominant species. There are NDDDB occurrences at this site.
 - An unnamed tributary to Walker Reservoir West flows through forested wetlands between the reservoir and an unnamed water body north of Interstate 84. It is piped under the highway and is at the toe of the embankment on both the northbound and southbound lanes. There may be some amount of fishery habitat as warm water fish appear to occupy both water bodies. The surrounding woodland is extensive and in combination with the brook provides very good wildlife habitat. Dominant wetland species are red maple, American elm, yellow birch and spicebush. There are NDDDB occurrences at this site.

- Broad areas of forested wetlands are associated with Gages Brook north of the highway near Exit 67. The soils are poorly drained and very poorly drained. Dominant species are red maple, American elm, yellow birch and spicebush. Skunk cabbage and mixed sedges and ferns are present on the wetter areas. The undeveloped areas north of the highway are large and mixed with farmland. Such diverse habitats provide very good wildlife habitat and Gages Brook may support a fishery resource. Near the interchange zone the brook is culverted under the roadways and the terrain is cleared. The area is low in wetland functions and values with drainage conveyance being the primary function. There are no NDDB occurrences at this site.
- Pipeline Segment 7 (Tolland): Several wetlands of note are located along this potential pipeline segment:
 - An unnamed tributary to Gages Brook drains north beneath Interstate 84 in western Tolland. It is piped under the highway near which broad, palustrine forested wetlands are located in close proximity to the highway embankment. The wooded landscape, open water, brook and undeveloped surroundings combine to provide very good local and perhaps regional wildlife habitat. There may be warm water fishery habitat in the brook as well. There are no NDDB occurrences at this site. Dominant species are red maple, American elm, yellow birch and spicebush. Skunk cabbage and mixed sedges and ferns are present on the wetter areas. A smaller, second tributary and forested wetland exists slightly to the east of the brook crossing and is also piped under Interstate 84. There are no NDDB occurrences at this site.
 - Chapins Meadow Brook supports a large mixed class wetland that occurs on both sides of the highway and in close proximity to the embankment. The brook is impounded by the northern highway embankment and piped under the highway with a second marsh area appearing to be impounded by Metcalf Road. The brook provides some fishery habitat; the marshes provide flood storage and pollutant renovation. There is likely interaction with the underlying groundwater aquifer. Such diverse areas provide very good local and regional wildlife habitat. Dominant species are red maple, American elm, yellow birch and spicebush. Skunk cabbage, woolgrass, cattails, *Phragmites* and mixed sedges and ferns are present on the wetter areas. The open water areas support water lilies and floating aquatic plants. There are no NDDB occurrences at this site.
 - There is a large, diverse wetland complex at the Exit 68 interchange associated with the Skungamaug River. It includes the broad Tolland Marsh Pond, the Skungamaug River, and several interconnecting ponds and streams. Soils are poorly drained and very poorly drained, as well as floodplain and alluvial in areas. The area is botanically diverse including red maple, American elm, yellow birch, sweet pepper bush and spicebush. Skunk cabbage, woolgrass, cattails, *Phragmites*, purple loosestrife, cardinal flower and mixed sedges and ferns are present on the wetter areas. The open water areas support water lilies, arrowhead, pickerelweed, and floating aquatic plants. The Skungamaug River provides good fish and shellfish habitat. The broad marshes and ponds provide flood control and pollutant renovation. The diversity of habitat types provides very good habitat for local and regional wildlife including waterfowl. The wetland is visually attractive and can easily be appreciated by all travelers on Interstate 84. There is a NDDB occurrence at this site on the south side of the interchange zone.

- 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. Functions and values are similar to those described under pipeline segment 7 above.
- 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 ten feet below the nearby roadway elevations. Vegetation includes red maple, yellow birch, common winterberry, spicebush, skunk cabbage, and princess pine.
- Pipeline Segment 13: An intermittent watercourse and associated forested wetland is 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 ten-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. Wetland species such as cattail, woolgrass, silky dogwood, and *Phragmites* have established in the area. Cedar Swamp Brook is a fast-flowing perennial stream that is conveyed beneath Route 44 via a box culvert / bridge. There is also a foot bridge over the brook on the south side of the road. One utility pipe is suspended from the bridge. The setting is forested (red maple, American elm, yellow birch) but the clearing between the two bridges is open and sunny supporting willows and sedges. Fish, frogs and stream salamanders likely inhabit the brook and local wildlife would make use of the water resource as well.
- Pipeline Segment 20: A forested wetland is conveyed under Route 44 between Rosal Apartments and the former Zenny's restaurant. South of the road, the wetland is poorly drained supporting red maple, silky dogwood, skunk cabbage and other hydrophytes. A shallow culvert conveys flow under Route 44 from south to north through an 18-inch pipe. Drainage conveyance and local wildlife support are the primary wetland attributes.
- 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 the potential interconnection scenarios with MDC lie entirely beneath paved roadways with a few exceptions where routing would be placed on the sides of bridges, installed through directional drilling, or is directed off of the Interstate into an upland area to avoid an overpass. Hanging pipes on the sides of culverts or bridges may be an option in several areas or directional drilling could be utilized to avoid wetlands. These activities are not likely to result in direct 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.

8.9.2 POTENTIAL DRAWDOWN IMPACTS

The pipeline and interconnection with MDC would utilize water from the Barkhamsted and the Nepaug Reservoirs to supply potable water to the University and Mansfield. Potentially affected wetlands lie around the perimeter of the Barkhamsted and Nepaug Reservoirs. The wetlands around the reservoir have coexisted with fluctuating water levels in the past. In fact, historical fluctuations of the reservoirs have likely exceeded present-day fluctuations, as the industrial customer base in central Connecticut was formerly heavily dependent on water. As such, significant drawdown impacts are not anticipated.

8.10 BIOLOGICAL ENVIRONMENT

Some clearing is likely to be required under this alternative. Such clearing would be limited to road edges where pipelines, pumping stations, pressure reducing valves, or meter pits would need to be installed. Clearing of established forests should be minimized in order to preserve as much of the existing environment as possible.

A Natural Diversity Data Base (NDDDB) request related to potential pipelines in East Hartford, Manchester, Bolton, South Windsor, Vernon, western Tolland, and the Route 44 corridor in Coventry for the MDC alternative was submitted in summer 2012. Response is pending. The NDDDB, Technical 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 MDC alternative that coincide with pipeline routes for other alternatives. Species identified include grasshopper sparrows, showy lady's slipper, vesper sparrows, American kestrels, bobolinks, eastern meadowlarks, savannah sparrows, and wood turtles. Descriptions of these species were presented in Section 4. Qualified personnel will 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.

8.11 INLAND FISHERIES

Farmington River

The Farmington Wild and Scenic River process included the preparation of a detailed study of the river's flow rates and the influence of those flow rates on fisheries and recreational activities. The results have been approved by the Farmington River Study Committee, which included representatives from the nine towns along the two segments, the Commonwealth of Massachusetts, the State of Connecticut, MDC, the Farmington River Watershed Association (FRWA), and the U.S. Department of the Interior. Staff assistance and funding for the project was provided by the National Park Service (NPS).

The adopted study and management plan found that: *"The flow regime that has existed since the Goodwin and Colebrook dams were established provides sufficient flows to maintain water quality and the resources that make the segment eligible for Wild and Scenic River designation."* (Upper Farmington River Management Plan, 1993.)

The actual minimum flow rates of the West Branch of the Farmington River are typically much greater than natural flow rates would be. Historically, the West Branch Reservoir has frequently maintained higher flow rates than the mandated minimum releases of only 50 cfs. A stream flow between 130 and 150 cfs appears to provide maximum protection of the trout fisheries, similar to the level of protection that has been historically maintained during the past 20 years of flow regime. This level of flow is typically released from the West Branch Reservoir by MDC. In order to maintain a comparable level of protection for the trout fisheries, a minimum flow greater than 50 cfs was deemed necessary as articulated in the Instream Flow Study.

There are no minimum low flow discharges required from the Barkhamsted Reservoir or the Nepaug Reservoir. These waters are fully allocated for potable water supply. As noted in the

Instream Flow Study, "the Nepaug and the East Branch drainage areas were excluded from the analysis since under normal or low flow conditions, both are 'totally' utilized for public water supply by the MDC."

The management plan concluded that all flow dependent resource needs could be met, even if there were water withdrawals of up to 20 mgd from the West Branch. The results of the water allocation study demonstrated that during wet (< 50% exceedance drought) and normal water years, there appears to be sufficient flow to satisfy all resource uses.

Under dry conditions (90% exceedance drought), there appears to be sufficient flow to support all studied resource uses including a 20 mgd withdrawal for water supply above and beyond the East Branch and Nepaug River uses, although under certain scenarios, the remaining surplus is small. During 99% exceedance droughts, there is insufficient water available in the system to accommodate a riparian agreement which is in effect on the West Branch between MDC and the Stanley Works, the desired flow scenario for maintenance of fisheries resources, recreation, and water supply.

The Management Plan further concluded the following:

"Given those considerations, the instream flow study indicates that some use of West Branch water for water supply could be compatible with protection of the river's instream resources and, therefore, with Wild and Scenic River designation. Based on the assumptions utilized in the Instream Flow Study, during wetter-than-normal, normal, and dry years, there appears to be sufficient water to provide for all resource needs and uses, including a potential water supply withdrawal of up to 7.3 billion gallons per year. Under severe drought conditions, there appears to be sufficient water to provide for all resource needs and uses and withdrawals of up to 7.3 billion gallons per year, if a near-optimum fisheries scenario is applied." (Upper Farmington River Management Plan, 1993.)

As noted above, the Instream Flow Study conducted for the Farmington River assumed that the Barkhamsted and Nepaug Reservoirs were not to be used for maintaining instream flow. Consistent with this assumption, the Barkhamsted and Nepaug Reservoirs have not been used historically to maintain instream flows. Thus, further use of their stored waters would not adversely affect instream flows or downstream water uses, including fisheries resources.

Willimantic River

Development at the University and in Mansfield Four Corners would result in additional water supply uses in areas that will be sewered. Thus, additional water would be released to the Willimantic River via the University's WPCF under this alternative. This may have a minimal benefit to instream flows in the river and thus to fisheries resources.

Hockanum River

If routing scenario #4A is selected, sewer flows could increase in Bolton in connection with induced development. However, additional flows entering the Manchester WPCF for eventual discharge to the South Fork are not expected to create any impacts to waste loading in this area.

8.12 WATER QUALITY AND STORMWATER MANAGEMENT

8.12.1 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 East Hartford portion of the MDC system, the most appropriate point of analysis for MDC are sample locations in East Hartford. MDC was contacted to provide DBP concentrations from sample sites in East Hartford. Table 8.12-1 summarizes the most recently-available year of data for two Stage 1 sites in East Hartford and one located in Hartford and compares them to the EPA's maximum contaminant levels (MCLs).

**TABLE 8.12-1
TTHM and HAA5 Concentrations at MDC Sample Sites in Hartford and East Hartford**

Main Street & Brewer Street, East Hartford	TTHM (ppb)	HAA5 (ppb)
May 2011	83.38	18.78
August 2011	51.78	30.40
November 2011	69.72	33.38
February 2012	73.55	69.99
Main Street & McKee Street, East Hartford	TTHM (ppb)	HAA5 (ppb)
May 2011	99.49	33.70
August 2011	44.12	33.14
November 2011	55.89	26.45
February 2012	91.90	16.59
MDC Headquarters, Hartford	TTHM (ppb)	HAA5 (ppb)
May 2011	75.34	33.80
August 2011	55.92	35.10
November 2011	54.17	32.53
February 2012	73.60	56.10
MCLs	80	60

The highest TTHM and highest HAA5 concentrations are sometimes but not always correlated at these three sample sites, and the lowest levels of HAA5 appear to occur during warm or cool months. Therefore, biodegradation of haloacetic acids may be occurring in some parts of the MDC system but not everywhere.

The terminus of the water main at Silver Lane is more distant in the distribution system than either of the fire station sample sites. However, for the purpose of this analysis, water quality at Silver Lane will be assumed equal to the average of the two fire station sites. DBP levels would then be as follows:

**TABLE 8.12-2
Assumed TTHM and HAA5 Concentrations at Silver Lane**

Silver Lane	TTHM (ppb)	HAA5 (ppb)
May 2011	91.44	26.24
August 2011	47.95	31.77
November 2011	62.81	29.92
February 2012	82.73	43.29
MCLs	80	60

For this alternative, after water leaves the West Hartford and Bloomfield treatment plants it is comingled and transmitted through East Hartford. Treated water would then enter the pipeline at the Silver Lane / Interstate 384 intersection and flow into either of the two alternative pipelines. TTHM and HAA5 concentrations will increase with age during this time, just as they increase throughout the MDC system. MDC has indicated that rechlorination at the pumping stations along a pipeline would likely occur to prevent chlorine residual from dropping below 0.3 to 0.4. Rechlorination has been found to enhance the formation of DBPs in some public water systems, although it is often necessary to maintain the proper residual.

Table 8.12-3 presents a narrative series of questions and conclusion relative to potential DBP levels resulting from use of the alternative in comparison to EPA's maximum contaminant limits (MCLs).

**TABLE 8.12-3
Treated Water Quality Summary Table for MDC**

Assessment	TTHM	HAA5
What is the typical concentration near the starting point at the present time?	48-91 ppb	26-43 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	Sometimes
Will treated water enter the pipeline with DBP levels less than half the MCLs?	No	Sometimes
Will the pipeline volume increase the age more than 1 day at 2.0 mgd?	No	No
Will new storage add significant age?	No ¹	No ¹
Do DBPs exceed their MCLs in the extremities of the host system?	Yes ²	Yes ²
What is the likelihood that DBPs will be lower than MCLs upon entry to the University system at 2.0 mgd? [high, moderate, low]	Low	Low
Will blending with the University's water mitigate DBPs at 2.0 mgd?	Yes	Yes
What is the likelihood that DBPs will be lower than MCLs in the University system at 2.0 mgd? [high, moderate, low]	Moderate	Moderate

1. Storage for pumping stations is assumed nominal
2. It is recognized that compliance is based on locational running averages and therefore this is not a reflection of non-compliance in the MDC system

The use of MDC 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 EPA's DBP Rule. However, there is a high likelihood that DBPs will be not be lower than the MCLs under this alternative when initially entering the University system, since water at Silver Lane is currently typically near or above the MCL for TTHM. Routing scenario #4B is longer than routing scenario #4A and thus may generate additional DBPs prior to entering the University system.

8.12.2 SURFACE WATER RESOURCES

This alternative will withdraw water from Barkhamsted Reservoir and the Nepaug Reservoir in the Farmington River basin (#4300) to provide water supply to the University and Mansfield. The surface water in these reservoirs is classified as AA, indicating that is suitable for fish and wildlife habitat, recreation, navigation, existing or proposed drinking water supplies, and industrial and agricultural water supply. The East Branch Farmington River and the Nepaug River downstream of Nepaug Reservoir are listed as not meeting the standard of designated use for aquatic life and recreation, and both areas have a fish consumption advisory.

The Connecticut Department of Public Health completed Source Water Assessment (SWAP) reports for the MDC water supply sources in May 2003. These reports noted that the overall susceptibility of the Barkhamsted and Nepaug Reservoirs to potential pollution sources was "low." Strengths included a large percentage of watershed area being owned by MDC, and MDC's comprehensive source protection program.

The use of the Barkhamsted and Nepaug Reservoirs to supply potable water to the University and Mansfield is consistent with the surface water designation of those sources. Furthermore, the installation of pipelines and other associated construction is not expected to impact surface water quality as best management practices will be utilized to prevent the introduction of construction dust and debris into nearby watercourses.

8.12.3 GROUNDWATER RESOURCES

Groundwater beneath potential pipeline areas is primarily mapped as GA with areas of GAA, GA- and GAA-Impaired, and GB designated along potential pipeline routes. The GAA designation is applied in eastern Manchester (pipeline segment 2) in the watersheds of several of Manchester's water supply reservoirs. Areas of reduced groundwater quality occur in East Hartford, Manchester, South Windsor, Vernon, and Mansfield.

Several areas of GA-Impaired exist along potential pipeline routes. The installation of new pipelines 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 mitigation measure for public health concerns.

8.12.4 STORMWATER MANAGEMENT

Impacts to stormwater quality are not expected. 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 on-campus would need to meet the University's design standards. Off-campus development will be evaluated during local permitting processes.

8.13 FLOOD HAZARD POTENTIAL

Several areas are located within the 1% annual chance floodplain in the vicinity of potential pipeline segments associated with this alternative. These include areas on Silver Lane (pipeline segment 1), crossings of Folly Brook, Globe Hollow Brook, Birch Mountain Brook, Ash Brook, and the Skungamaug River (pipeline segment 2), the Willimantic River (pipeline segments 2, 4, and 12A), the Hockanum River (several locations), Gages Brook, and Chapin Meadow Brook (pipeline segment 7), Nelson Brook (pipeline segments 13 and 15), and Cedar Swamp Brook (pipeline segment 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 (SCEs) are located along the Hockanum River (pipeline segment 7) and the Willimantic River (pipeline segments 2, 4, and 12A). Routing scenario #4A would require a SCEL permit for the Willimantic River crossing in Mansfield Depot, while routing scenario #4B would require a SCEL permit for at least three areas along the Hockanum River as well as a Willimantic River crossing on Route 195. However, pipeline work within the SCEL boundary is not expected to increase flood hazard elevations.

8.14 PHYSICAL ENVIRONMENT

8.14.1 TOPOGRAPHY

The study area extends from the Connecticut River Valley into the Eastern highlands in Connecticut. While areas located in East Hartford and Manchester are generally flat and associated with the former lakebed of Glacial Lake Hitchcock, eastern areas associated with the Eastern highlands include many hills and ridgelines sloping down into stream and river valleys.

The ground elevation at Silver Lane in East Hartford is approximately 60 feet. The ground elevation along routing scenario #4A rises to approximately 780 feet in Coventry near Mark Drive before declining to approximately 290 feet near the Willimantic River. The ground elevation along routing scenario #4B rises to approximately 780 feet between Exit 67 and Exit 68 on Interstate 84, and drops to approximately 530 feet near Exit 68. Ground elevation climbs to approximately 760 feet near Anthony Road in Tolland, and again declines to approximately 320 feet near the Willimantic River. The proposed connection to the University system on North Hillside Road is located at approximately 665 feet for both scenarios.

Given the changes in elevation over each pipeline route, a combination of pumping stations and one pressure reducing valve will be necessary to direct water to Mansfield.

8.14.2 SURFICIAL GEOLOGY

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

8.14.3 BEDROCK GEOLOGY

This alternative will not rely on bedrock well sources. Several fault lines are mapped along potential pipeline segments associated with the MDC alternative. However, these fault lines are generally considered to be inactive. The presence of shallow bedrock or ledge is a concern along the potential pipeline routes. This will be a design consideration.

8.15 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 MDC alternative and associated new water mains and utility work will not result in any long-term noise impacts. New pumping stations also are not typically significant noise generators. 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.

8.16 SOLID WASTE, HAZARDOUS MATERIALS, & 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 MDC reservoirs 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 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.

The potential pipeline routes pass several areas with potential pollution sources. However, the installation of pipeline routes will not result in an impact to potential pollution sources. In addition, water mains will be pressurized such that contaminants in the surrounding soil would not be able to enter into the pipe and contaminate the water (except in case of a main break).

Construction and demolition-related waste will be generated by the project. Disposal of these wastes will be handled in accordance with applicable solid waste statutes and regulations.

8.17 OTHER PROJECT IMPACTS

8.17.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Certain adverse impacts associated with construction of an interconnection with MDC 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.

8.17.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The construction of the interconnection 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;
- Potential well drilling and development;
- Installation of water mains to connect to the University and Mansfield; and
- Installation of associated infrastructure, pumping stations, a pressure reducing valve, etc.

8.17.3 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 the alternative include the following:

- Additional withdrawals from the Barkhamsted and Nepaug Reservoirs;
- Interbasin transfer of water from the Farmington River basin to the Willimantic and Natchaug River basins;
- Formation of additional disinfection byproducts 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;
- Additional development due to the presence of the water main, with the highest risks along the six-mile section of Route 44 in Coventry; and
- The furtherance of duplicative water service in the State, which is contrary to the coordinated water supply planning overseen by DPH.

8.17.4 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 adherence to the Farmington River flow management plan with controlled releases from the West Branch to ensure adequate flows in the Farmington River main stem;
- 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;
- Designs that hang pipe on bridges or include directional drilling to prevent direct wetland impacts;
- 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; and
- Adherence to best management practices to mitigate impacts to stormwater runoff.

8.18 EVALUATION OF PROJECT COSTS

8.18.1 LAND ACQUISITION AND EASEMENT COSTS

The implementation of this alternative will require the purchase or easement of land for pumping stations and associated storage facilities, a pressure reducing station, and a new storage tank in Mansfield Four Corners, if such tank is pursued. The cost for these items could range from minimal (transfer of land from the University for the tank) to many thousands of dollars.

8.18.2 COSTS TO IMPROVE EXISTING INFRASTRUCTURE

Reservoir improvements and water treatment plant upgrades are not necessitated by the provision of water from MDC to the University and Mansfield. Water treatment plant upgrades are already a part of MDC's long-term planning. However, these costs are not directly related to a regional interconnection and are not project-related costs in the context of this EIE.

8.18.3 CONSTRUCTION COSTS

Pumping-Related Costs

The number of pumping stations required for a regional pipeline will depend on the route selected and the rate of water transfer that is ultimately pursued. It is likely that three or four pumping stations will be required. Nominal storage will need to be provided for each pumping station in order to improve hydraulics and provide a draw for pump suction.

For the purpose of this EIE, costs for pumping stations are based on the report completed by MDC's consultants that evaluates a 3.0 mgd transfer of water. This EIE recognizes that actual costs would be refined and likely different.

Pipeline and Associated Water Mains

This analysis assumes a 16-inch pipe diameter. 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, except not along interstate highways

Table 8.18-1 lists the estimates for the two potential pipeline routes.

**TABLE 8.18-1
Construction Cost Estimates for Potential MDC Pipeline Scenarios**

Alternative Pipeline Route	Route	Pipe Diameter	Cost (million)
4A	I-384 & Route 44	16-inch	\$38.33
4B	I-84 & Route 195	16-inch	\$41.07

Additional pipeline-related costs include the interconnection with meter, and the pressure-reducing station that is necessary along Route 195. Table 8.18-2 summarizes these costs. The lowest-cost pipelines are carried forward for this table.

**TABLE 8.18-2
Construction Cost Estimates for Preferred MDC Pipeline Scenario and Related Infrastructure**

Component	Cost
Pipeline	\$38,330,000
Interconnection and Meter	\$400,000
Pressure Reducing Vault	\$500,000

8.18.4 ANALYSIS OF PROBABLE CAPITAL COSTS

The costs described above are summarized in Table 8.18-3.

TABLE 8.18-3
Summary of Estimated Costs for Alternative #4

Component	Cost
Pumping stations*	\$3,000,000
Pipelines	\$38,330,000
Interconnection/meter	\$400,000
PRV	\$500,000
<i>Design/contingency (20% of above)</i>	<i>\$8,446,000</i>
Permits and Approvals	\$400,000
Legal agreements and services	\$200,000
Totals	\$51,276,000
<i>Normalized Cost per MGD</i>	<i>\$25,638,000</i>

*Includes nominal storage and rechlorination systems

Most of the mitigation opportunities listed in Section 8.17.4 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. 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 other towns will have a moderate cost to each community, on the order of \$10,000 for each.

Continued adherence to the Farmington River flow management plan with controlled releases from the West Branch to ensure adequate flows in the Farmington River main stem are required regardless of the action selected in this EIE. Therefore, these costs are not applicable.

8.19 FINDING

Interconnection with MDC is a feasible alternative that will not result in significant environmental impact. This alternative meets 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.