DRAFT COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

FOR

TOWN OF WESTMINSTER, MASSACHUSETTS

NOVEMBER 2006

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EXECUTIVE SUMMARY

The purpose of the Comprehensive Wastewater Management Plan (CWMP) for the Town of Westminster is to provide a plan to meet the Town's wastewater management needs through strategies that advance, or at a minimum do not conflict with, the goals of the community. In addition, the CWMP seeks to protect environmental resources and minimize impacts to the Nashua River Basin. Recent planning efforts within Westminster emphasized the Town's desire to maintain its rural character, preserve its agricultural heritage and open space assets, and limit sprawled growth. These general goals were established as the planning context for the CWMP, which enabled development of a plan that does not conflict with community goals. In fact, the recommended plan for the CWMP specifically supports several goals of the March 2000 Westminster Draft Master Plan, as follows:

- By including the industrial-zoned areas (State Road East Area and Eastern Westminster Area - Route 31) in the phased sewer program, the plan supports the *Economic Development Goal* to "emphasize the attraction of clean stable industries." Compared with on-site wastewater management, municipal sanitary sewer provides a cleaner and more stable management solution for industrial facilities and provides greater environmental protection.

- The plan supports the *Open Space and Recreation Goal* to "preserve water quality" by targeting densely developed residential and industrial areas located near the Town's critical surface water resources for improved wastewater management. Both the stormwater management recommendations and the wastewater management plan seek to improve surface water and groundwater quality.

- Similarly, the stormwater management recommendations and the wastewater management plan support the *Public Services and Facilities Goal - Policies for Town Facilities* to "Expand public sewer and water to densely developed areas to protect existing water supplies and alleviate pollution of lakes, surface runoff, and groundwater, and to industrial areas according to the economic development goals." Each area included in the phased sewer program consists of either: (1) dense residential development for which using on-site wastewater management is difficult (including tight tanks in some areas); (2) dense residential development that is located immediately adjacent to critical environmental resources or municipal drinking water supplies; (3) dense residential development for which on-site wastewater management is the suspected cause of documented water quality impacts; (4) areas zoned for future industrial development; or a combination of these conditions.

- By including land designated for planned municipal affordable housing development in the phased sewering program, the plan supports the *Housing Goal* to "Build affordable housing as agreed in (the) 1986 town agreement with the state."

- The previous points demonstrate that the CWMP also supports Executive Order 385, whereby state and local agencies must engage in proactive and coordinated planning oriented toward both resource protection and sustainable economic development.

- The CWMP engaged in "proactive planning (and) interagency coordination" by working with the Town Planner to identify current and future affordable housing developments and planning initiatives that should be targeted for inclusion in the sewer plan. The CWMP supports "local or regional growth management plans" such as the Draft Master Plan, the Westminster Community Development Plan (Executive Order 418), and the Open Space and Recreation Plan. Finally, the Chapter 8 addresses the subject of future growth management in Westminster. By virtue of

targeting sewer expansion for areas zoned for future industrial development, the plan "promote(s) sustainable economic development in the form of; a) economic activity and growth which is supported by adequate infrastructure and which does not result in, or contribute to, avoidable loss of environmental quality and resources, and b) infrastructure development designed to minimize the adverse environmental impact of economic activity."

Wastewater Management Recommendations

Average daily wastewater flow in the Town sewer system was estimated in 2005 to be approximately 164,700 gallons per day (gpd), including infiltration and inflow (I/I) with the potential to reach approximately 330,000 gpd in the future from previously sewered areas, current commitments, and planned sewer extensions not included in this CWMP.

The wastewater needs analysis determined that a total of thirteen (13) study areas in Westminster are suitable for continued use of on-site wastewater management under Title 5 and that twelve (12) study areas are in need of improved wastewater management.

The wastewater alternatives analysis determined that continued on-site wastewater management is the preferred approach compared with other available alternatives for three (3) needs areas. These areas consist of the Shady Avenue Area, the State Road West Area, and the Lake Drive West Area. The alternatives analysis determined that expansion of the municipal sewer system is preferred for nine (9) needs areas. Of the nine needs areas recommended for sewer expansion, six (6) were classified as having a high priority. These areas are the State Road East Industrial Area, the Eastern Westminster Area, the Lake Drive East Area, the Edro Isle Area, the Lakewood Park Area, and the Leino Park Area. In addition, two other areas identified during the alternatives analysis are recommended for high priority sewer expansion. These are the Dawley Road Area and the Municipal Housing Parcel on Meetinghouse Road. The remaining three (3) needs areas are recommended for later phases of sewer expansion, and were classified as having a low priority. These areas are the Bacon Street Area, the Bakers Grove Area, and the East Wyman Area.

Sewer expansion for these areas is proposed through a phased expansion plan with construction beginning by 2008, and each phase having an estimated construction duration of 2-years. The construction of phases 1 through 4 is expected to be completed by 2020. Phase 5 consists of undeveloped industrial areas and the municipal housing parcel and would proceed as development occurs. Three major components of the existing sewer system require upgrades prior to implementing the proposed sewer expansion plan. The Whitman River Pump Station and the Narrows Road Pump Station are two of these components, where existing sewer flows have reached or exceeded current pumping capacity. The third component, the Fitchburg interceptor, carries flow from Westminster into Fitchburg. It has enough capacity to handle current sewer flow and known future connections, but not the proposed sewer expansions. These upgrades, referred to as Phase A, are recommended to begin in 2007 and are anticipated to take 2-years to complete. Westminster must also revise the Intermunicipal Agreement (IMA) with the City of Fitchburg to increase the allowable wastewater discharge to the City for treatment to accommodate the plan. Westminster met with the Fitchburg Department of Public Works to discuss potential revisions to the IMA when the recommended plan was completed. The Town of Westminster and Town Counsel should meet with City of Fitchburg officials to revise the IMA.

Opinions of probable cost for each phase are provided based on conceptual sewer designs that were prepared during the alternatives analysis and refined during the development of the plan. The opinions of probable project cost (October 2006, ENR 7883) for each proposed phase are as follows: Phase A is $3.27 million, Phase 1 is $4.02 million, Phase 2 is $2.65 million, Phase 3 is $2.42 million, and Phase 4 is $2.23 million for a total of $14.59 million. Costs for capital improvements or other financial

considerations resulting from revisions to the IMA with Fitchburg are unknown at this time and not included in these estimates.

The first four phases of the proposed sewer expansion plan consist of mainly residential areas that are mostly developed. There are approximately 550 current and future properties within these phases. The estimated wastewater flow from Phases 1 through 4 is approximately 118,000 gpd (including I/I) on an average day, which is roughly 87-percent of the current average day flow in the existing sewer system. Phase 5 consists of undeveloped industrial-zoned areas and planned affordable housing in Westminster. These areas have the potential to contribute an additional 93,000 gpd (including I/I) to the sewer system on an average day. The exact amount of flow and timeline for this phase is less certain since these areas currently have access to the existing municipal sewer system and are dependent on development plans that may be subject to change.

The proposed plan Phases 1 through 4 includes approximately 52,500 linear feet (9.9 miles) of sewer pipe, 3,600 linear feet of force main, 342 grinder pumps, 3 minor pump stations, and 2 major pump stations. One of the major pump stations represents a rehabilitation of the existing pump station at the golf course on Ellis Road to allow increased flow from the proposed Lake Drive East sewer expansion area.

The sewer plan also recommends an administrative management plan to prevent sewer expansion to areas outside of those contained in the plan. Besides preventing growth that is not desired by the community, this plan would preserve sewer system capacity for areas already committed to by the Town and for the needs areas identified in this CWMP.

Analysis in this CWMP and on-going I/I investigations performed for the DPW by other consultants have not identified significant sources of I/I in the municipal sewer system. However, the DPW Director suspects that there may be substantial sources of inflow based on the Town's observations of system response to wet weather. The recommendations of the on-going I/I investigations should be addressed and large I/I sources should be targeted and corrected immediately. If the report does not identify significant sources, the Town should conduct additional investigation particularly for inflow sources.

The Board of Health regulations should be modified to allow the use of cluster wastewater management systems as an option for proposed housing complexes and cluster developments instead of leaving sewer as the only alternative. This would protect capacity in the municipal sewer system and facilitate development goals presented in the Westminster Draft Master Plan. The regulations could still prevent construction of individual on-site systems on nearby lots and/or easements.

The Board of Health should implement a voluntary on-site wastewater management plan to evaluate owners' interest in maintaining their subsurface disposal systems. The plan would require a database that tracks septic tank pumping in Town and identifies systems that are overdue for pumping. The recommended pumping schedule could be every three or four years, as determined by the Board. The Board would provide notice to owners when their system should be pumped. Based on the success of this plan, the Board should evaluate a mandatory, town-administered on-site wastewater management plan. This plan would ensure regular maintenance of on-site systems and would allow the Board of Health to gradually locate failing systems in Town. Any plan that is implemented by the Board of Health should focus on the needs areas proposed for sewer expansion identified in this CWMP until such time that municipal sewer can be extended to those areas.

Water Supply Recommendations

In 2005, average daily water demand in the Town water system was 360,216 gpd and maximum daily demand was 644,000 gpd. By year 2025, average daily water demand in Westminster is projected to reach 568,900 gpd and maximum daily demand is projected to reach 1,149,200 gpd. Westminster currently obtains all water supply for the municipal water system through an IMA with the City of Fitchburg. The Fitchburg Regional Water Filtration Facility delivers water to the Town's Hager Park Pump Station, which pumps to the water system. This pump station has a maximum capacity of 1.0 million gallons per day (mgd). The Town should monitor maximum daily demand and other extended periods of high demand each year to determine if it will soon exceed the permitted daily water supply limit with the City and the capacity of the pump station. The Town can exceed this usage for a total of seven days in a calendar year without triggering requirements to renegotiate for the right to a maximum daily flow up to 1.5 million gallons per day (mgd) in the future. The needs analysis recognizes that based on projected maximum daily demand, the Town may exceed both the current IMA supply limit and the maximum capacity of the Hager Park Pump Station within the planning period. The CWMP recommends that the Town evaluate its options for increasing water supply and system capacity and determine a schedule for implementation. The Town has a potential groundwater well site, referred to as Site 20. Installing this well would require significant infrastructure in addition to a pump station and treatment system and the permitting process for a new groundwater source would take approximately five to seven years in its entirety to gain approval.

While average daily demands have fluctuated within a small range since 2001, maximum daily demand has steadily increased. The Town should review its practices for restricting seasonal outdoor water use and enhance current programs to prevent maximum demand from exceeding current water supply. The Town should also review its current drought management program.

The Town should continue to enhance its water conservation programs in order to preserve the Town's supply and reduce impacts to stressed basins in the Nashua River Watershed. Specific areas or programs suggested include: public education, leak detection, metering/maintenance, rates/pricing, residential water use strategies, public sector water use strategies, industrial and commercial water use strategies, and water supply management. The CWMP recommends that future water conservation programs should include all residences in Town, as those with private wells are just as likely to increase water use during the warmer months as residences connected to the municipal water system. Private wells within stressed river basins have the same cumulative impact as a municipal supply that is distributed to many customers.

Stormwater Management Recommendations

The CWMP recommends non-structural stormwater management approaches as a relatively simple method of improving town-wide stormwater conditions. These approaches include public education, employee training, pet waste collection, landscape management, and street sweeping programs. The CWMP acknowledges that citizen involvement is crucial for successful stormwater management, and is a requirement of the National Pollutant Discharge Elimination System (NPDES) Phase II program.

The CWMP identified preferred stormwater management systems for use in Town that are the most beneficial and cost effective. These systems should be given priority for implementation and should be encouraged in new development and redevelopment applications. The preferred systems include dry wells for uncontaminated roof runoff; reversed elevation systems for new or redeveloped parking areas; deep sump catch basins with hoods; and centralized stormwater treatment and infiltration systems for large residential development, large commercial development, and industrial development.

The CWMP recommends various administrative options and local regulations that can improve stormwater management and water quality in Town. These recommendations also support the Town's current obligations under their existing NPDES Phase II permit.

The Town should amend the zoning regulations to require a stormwater management permit to regulate stormwater in redevelopment and new development that does not fall under the jurisdiction of the Planning Board. The goal of the permit would be to mitigate stormwater impacts pertaining to runoff, infiltration, and water quality to the maximum extent practical based on the type of proposed development. The permit should also encourage the use of post-construction runoff controls, which include the use of structural Best Management Practices (BMPs) and standards for long-term maintenance.

In addition, the following administrative and regulatory controls are recommended:

- Current review procedures should be enhanced to include coordination between applicable Town departments and should include regular inspection of on-going construction activities in the Town.

- The Flood Plain District established by the zoning regulations should be modified to prohibit stockpiling and disposal of snow and ice containing sand and deicing chemicals.

- The site plan review process should include an evaluation of proposed structural BMPs from an operations and maintenance perspective by the DPW or its designee.

- The Westminster Stormwater Committee is currently preparing a regulation to prohibit non-stormwater discharges to the Town storm drain systems. The regulation should include appropriate enforcement procedures.

- Regulations should address dewatering operations occurring on-site or off-site as a result of construction.

- There are a number of other stormwater management controls that are required by the NPDES Phase II permit that must be eventually addressed by the Town such as developing a procedure for receipt and consideration of information submitted by the public regarding local construction activities; developing and implementing a program for monitoring the performance and condition of BMPs post-construction; and developing a funding mechanism to support operation and maintenance of structural BMPs.

1. Existing Environmental Conditions

1.1 Introduction

The Comprehensive Wastewater Management Plan (CWMP) for the Town of Westminster, Massachusetts is formulated in response to the needs of the Town, and designed to protect the environmental resources both within Westminster and within the broader regions surrounding the Town. Before the CWMP can be developed, the existing environmental conditions of the area must be documented to provide a context for wastewater needs and solutions. In addition, the important role that potable water and stormwater play within the hydrologic regimen of the area is represented through a corresponding evaluation of water and stormwater management considerations. Chapter 1 provides a summary of this background. The first section details the Town's built environment, offers a historical perspective on current conditions, and indicates what the Town hopes to accomplish in the future. The second section provides an overview of the natural environment within Westminster's borders and within the boundaries of the river basins in which the Town resides. The section also details known environmental hazards located within Westminster and adjacent towns, including Massachusetts Department of Environmental Protection (MA-DEP) reportable releases, spills and potential threats.

1.2 Built Environment

The Town of Westminster encompasses an area of approximately 37.3 square miles in northern Worcester County. It is bounded by the cities of Fitchburg and Leominster to the east and Gardner to the west. Hubbardston and Princeton are located to the south and the Town of Ashburnham abuts Westminster to the north. It is part of the Montachusett Regional Planning Area. The primary highways on an east/west axis are State Routes 2 and 2A, and the primary north/south roadway and connector to Worcester is State Route 140.

1.2.1 Land Use

Historic land use development, as described in the Town's Draft Master Plan (March 2000), started with the original settlement of Academy Hill. This area included the old town common and several historic structures. Eventually the Town Center moved westward to its current location in the early 1800s. That move and the Town Center's new location became the basis for the commercial development patterns that emerged primarily along the east/west axis that paralleled major roadway development. There were additional scattered village developments through the 19th century, primarily residential in nature with some small manufacturing in textiles, furniture and cabinetry, as well as the historic cracker bakery.

Westminster never experienced significant commercial or industrial development as the town center was never easily accessible by existing rail lines. Over the past two centuries several thriving commercial ventures contributed to development of certain parts of the community, such as Steam Valley at Spruce and South Streets. Over time, however, when those manufacturing enterprises discontinued and employment dwindled, the area reverted to its rural character and was never redeveloped. The agricultural economy that sustained Westminster in its early days has continued to be a major part of the landscape today.

Many of the Town's existing streetscapes were created in the early 20th century when the Town Center took on much of its current character. Several notable public buildings were constructed including the Forbush Memorial Library and the Upton School. The recreational areas for which the Town is also now known were becoming popular during that time, including the development of Wachusett Park. This resort area, situated on Wachusett Lake, operated in the late 19th century until it closed in 1923. The Mohawk Trail and the Midstate Forest & Field Club hiking trail also brought tourists and visitors seeking

recreational activity. Seasonal homes and cottages began to spring up around the many ponds and lakes in the Town. An auto road was constructed to the top of Wachusett Mountain, the largest stand-alone mountain east of the Berkshires, in 1926 and the Civilian Conservation Corps cut the first ski trails on the mountain in the 1930s. By that time, Westminster had achieved the status of a vacation resort destination, and it has remained so to this day.

Westminster's zoning districts dictate development in Town as follows:

1. **Residential Districts**
   - R-I – Residence - minimum lot size: 50,000 square feet
   - R-II – Residence - minimum lot size: 60,000 square feet
   - R-III – Residence - minimum lot size: 86,000 square feet

2. **Commercial Districts**
   - C-I – Highway - minimum lot size: 40,000 square feet
   - C-II – Neighborhood - minimum lot size: 10,000 square feet
   - C-III – Downtown - minimum lot size: N/A

3. **Industrial Districts**
   - I-I – Industrial - minimum lot size: 40,000 square feet
   - I-II – Industrial - minimum lot size: 40,000 square feet

4. **Conservancy Districts**
   - F – Floodplain District

This summary is based on the Town of Westminster Zoning By-Law, amended November 2001.

Approximately 27-percent of Westminster consists of zoning district R-1, 46-percent consists of district R-II, and 19-percent consists of district R-III. Zoning district C-I comprises 3-percent of Town and districts C-II and C-II each comprise less than 0.1-percent. The industrial districts I-I and I-II cover 4-percent and 1-percent of Town, respectively. Approximately 92-percent of the Town is zoned for residential development. Although large lot residential zoning is common, it is not necessarily aligned with the Town's stated goal of preserving its rural character. As pointed out in the Town's Community Development Plan (June 2004), the current zoning "accelerates the conversion of a community from rural to suburban in character by consuming large amounts of land and encouraging sprawled development." Several strategies to address this apparent conflict, including "open space" or cluster zoning, were proposed in the Plan.

Much of the existing development in Town occurred prior to zoning regulations, which has enabled the land use characteristics previously described.

The Floodplain District is an overlay district that serves to protect the public health, safety, and property and to preserve the natural flood control, storage, and water recharge characteristics within the flood plain. The district is defined by the 100-year floodplain as depicted on the Flood Insurance Rate Maps (FIRM) for Westminster provided by the Federal Emergency Management Agency (FEMA).

1.2.2 Buildout Analysis

The Town's Draft Master Plan includes a section on buildout which relies on data developed for the Master Plan and the Greater Gardner Sustainable Growth Management Plan. Those plans can be referenced for a more detailed analysis of the information provided in this chapter. Additional data has

been abstracted from the buildout analysis performed by the Montachusett Regional Planning Commission in 2001 under the Executive Order 418 Community Preservation Initiative. The purpose of such an analysis is to determine the development potential in the community on the basis of existing zoning, and consequently what the demands of such build-out might require in terms of infrastructure and services. Most of Westminster (approximately 85%) is currently undeveloped, and of that acreage which is "developable" (e.g. other than wetlands, water bodies, state forests, conservation land) most of it is zoned residential. The current general land use breakdowns show that residential use accounts for over 60% of development in Town. Approximately 34% is devoted to agricultural uses, and industrial and commercial uses represent 3.5% and 2.2%, respectively.

The City of Fitchburg and the Commonwealth of Massachusetts are the two largest landowners in Town, and the explicit purpose of that land is to maintain the open land either for recreation (state parks are approximately 2,900 acres) or water supply protection purposes (almost 1,600 acres). Nevertheless, the Town's recent Draft Master Plan explores in greater detail the nature of land use changes in Westminster, which indicates that the Town continues to lose land in open space categories to residential, commercial, and industrial uses. Approximately 1,400 acres of land have been converted to development since 1971.

1.2.2.1 Residential Buildout Analysis

The MRPC buildout analysis applied current zoning regulations and by-laws to the total currently undeveloped residentially zoned land. The analysis also considered the following constraints to development:

- 100-foot inner riparian zone of the Rivers Protection Act and the Floodplain District (absolute constraint)
- 100-200-foot outer riparian zone (partial constraint)
- Wetlands (partial constraint)
- Groundwater Protection Districts (partial constraint)

The results of the analysis are presented in Table 1.1 – Residential Zoning Districts and Future Population, and indicate that Westminster contains almost 6,700 buildable residential lots. Both the projected number of dwelling units and the additional future residents estimated by this analysis are more conservative than the figures reflected in the Draft Master Plan. The methodologies employed vary slightly, and the Master Plan also relied on a projected 2000 population that was overestimated by approximately 100 residents. The data provided below is based on U.S. Census 2000 data (for population and household characteristics including persons per household) and projections by the Massachusetts Institute for Social and Economic Research (MISER), a commonly cited resource for these statistics.

Table 1.1
Residential Zoning Districts and Future Population

District	Zoning Requirements	Undeveloped Land Area	MRPC Projected Dwelling Units	Additional Future Residents
R1	Min. lot size = 50,000 s.f.	142,316,162 s.f.	2,457	5,921
R2	Min. lot size = 60,000 s.f.	223,080,340 s.f.	3,210	7,696
R3	Min. lot size = 86,000 s.f.	105,328,360 s.f.	1,027	2,474
		Total Dwelling Units	**6,694**	**16,091**

1.2.2.2 Commercial/Industrial Buildout Analysis

There are three commercial and two industrial districts in the Town of Westminster. The commercial districts are defined as Highway (C1), Neighborhood (C2), and Downtown (C3). Of these, the C2 District was determined to be at buildout at the time of the analysis. The industrially zoned areas are differentiated by allowable lot coverage (25% permitted lot coverage for I-1 and 65% lot coverage for I-2). Table 1.2 - Commercial/Industrial Zoning Districts displays the buildable areas associated with each.

Table 1.2
Commercial/Industrial Zoning Districts

District	Undeveloped Land Area (Sq. Ft.)	MRPC Projected Buildable Square Feet
C1	12,468,045	6,659,741
C2	0	0 (at buildout)
C3	196,664	46,806
I1	24,965,601	6,314,599
I2	4,625,595	2,919,956
Total Projected Buildable Commercial/Industrial Square Footage		**15,941,102**

These statistics are calculations based on a methodology that looks at constraints on development and allowable buildout based on zoning regulations. They are not estimates of rate of growth or the manner in which that growth will take place. Other factors clearly impact the actual development trends in the community and are discussed elsewhere in this report.

1.2.3 Historical Population

Based on data provided in the Town's Community Development Plan (June 2004) and Draft Master Plan (March 2000), over the 40-year period between 1960 and 2000, the population grew by over 70%. Total population in 1960 was 4,022 and 6,907 in 2000 (US Census Data). Over the past decade, the Town has experienced an approximately 1.3% rate of annual growth. Population figures by decade are provided in Table 1.3 - Historic Population.

Table 1.3
Historic Population

Year	Population	Percent Change
1960	4,022	---
1970	4,273	6.2%
1980	5,139	20.2%
1990	6,191	20.5%
2000	6,907	11.6%
2010*	7,395	7.1%
2020*	7,953	7.5%
2025**	8,484	N/A

* Projections conducted by MISER ("Middle" Projection) based on 2000 Census Data.
** Projection based on historical 1.3% annual population growth.

Trends in population and dwelling units were evaluated in the Town's Community Development Plan. In the decade between 1980 and 1990, 423 new housing units were built in Town. Between 1990 and 2000,

only 289 new units were built. That represented a population increase of 716 people. Like much of the rest of the state, household size in Westminster decreased over this period. This results in a pattern of development whereby rate of housing growth is faster than population growth, a symptom of sprawled development. Year 1999 saw the greatest number of building permits issued (69) dating back to 1996. Since 1999, 39 building permits on average have been issued annually.

1.2.4 Population Growth Projections

Table 1.3 includes projected populations extended through the 20-year planning period of this report. Based on the 1.3% annual growth rate experienced over the past decade, population in 2025 will be approximately 8,500 people. Using an average household size of 2.8 (average household size in Westminster dropped from 2.84 to 2.73 between 1990 and 2000), that equates to approximately 563 new dwelling units. At that growth rate, full residential build out would not take place in the community for well over 200 years.

Implications of the buildout analysis for commercial and industrial development are not entirely clear. As stated in the Master Plan, "…the fact (of the enormous available square footage) …does not mean the development, or even a fraction of it, will occur. Is there a market for the use? How much investment is justified for the location will also determine the intensity of the use and the density at which it will be developed." Based on Westminster's commercial history, it is unlikely that the Town will approach the buildout potential embodied by the current zoning.

1.2.5 Local and Regional Planning

As referenced previously, the Town has recently conducted several planning studies which evaluate local and regional conditions relative to Westminster's own vision for their future. These include major studies such as the March 2000 Draft Master Plan, the June 2004 Community Development Plan, and the 1999 Open Space Plan. Another regional plan with bearing on the Town is the Greater Gardner Sustainable Growth Management Plan.

The Draft Master Plan provides a comprehensive evaluation of the Town's goals in a variety of areas, including:

- Land use
- Economic development
- Environment – History, Character & Image
- Environment – Open Space & Recreation
- Public Services
- Circulation (Road Systems)
- Housing

Each of these goals is described in the context of the policies that can allow the goals to be realized. Of primary relevance to this study are the environment and public service goals. As described in the plan, it is the Town's goal to "protect the natural and cultural resources and improve the aesthetics of Westminster to preserve its historical buildings, maintain its village character and enhance its rural image." Regarding Open Space, the Town seeks to "preserve open space to maintain the Town's rural character and to provide passive and active, informal and formal recreational activities for all age groups and abilities." The public facilities goal as stated is to "provide residents a wide range of governmental services and facilities and the necessary public utilities." In terms of policy, this latter goal was envisioned to be achievable by virtue of:

- Maximizing use of town facilities through renovation and/or improved maintenance
- Acquisition of land for future municipal use
- Expansion of sewer and water to densely developed areas to protect existing water supplies and alleviate pollution of lakes, surface runoff, and groundwater, and to industrial areas according to the economic development goals
- Provision of superior educational facilities for all residents in schools and libraries

The purpose of the CWMP is to ensure that the Town's wastewater management needs can be met through strategies that advance, or at a minimum do not conflict with, these larger community goals. Public water and sewer infrastructure is frequently the catalyst for secondary growth along the corridors served by the public utilities. All of the planning documents referenced for this study emphasized the Town's desire to maintain its rural character, preserve its agricultural heritage and open space assets, and limit sprawled growth. This will be the planning context in which this study evaluates alternatives for wastewater management.

1.3 Natural Environment

1.3.1 Climate

The National Oceanic and Atmospheric Administration maintains climate data for Worcester, Massachusetts. This weather station was identified as the nearest station to Westminster and the data provided was based on average values collected over a thirty year period. The normal daily mean temperatures in January and July are 23.6^{o}F and 70.1^{o}F, respectively. The normal precipitation is 49.05 inches annually, and the average total snowfall is 68.4 inches annually. The mean number of days with precipitation is 134. The average wind speed is 10.1 miles per hour (mph) and the average relative humidity is 75-percent in the morning and 57-percent in the afternoon.

1.3.2 Soils

The *Interim Soil Report for Northwestern Worcester County Massachusetts*, prepared by the Northwestern Worcester Conservation District in cooperation with the USDA – Natural Resources Conservation Service was used to identify soil types in the Town of Westminster. The interim soil survey is available in advance of the final report, which is an update of the Worcester County soil survey that was published by the USDA in 1927.

The various soil types within the Town of Westminster were assessed and three general soil classifications were established based on similar properties. Approximately 82-percent of the soils in Westminster are classified as being Peru-Marlow, Berkshire-Marlow, Becket-Skerry, Lyman-Tunbridge-Berkshire and Woodbridge-Paxton Association. These soils are characterized as having well draining, rolling, and rocky terrain. Peru-Marlow, Berkshire-Marlow, Becket-Skerry, Lyman-Tunbridge-Berkshire and Woodbridge-Paxton Association are located throughout the Town with Peru-Marlow being the most prevalent. Colton is a soil type that comprises approximately 12-percent of the Town and is located prevalently around Wyman Pond and Crocker Pond. Colton is a well draining soil with rapid permeability characteristics. Bucksport-Wonsqueak muck-soils compose 6-percent of the overall soils and are a poorly draining soil that is subject to ponding. Bucksport-Wonsqueak mucks were commonly identified in wetland areas. The various soil groups are summarized in Table 1.4, along with their predominant characteristics.

Table 1.4
Soil Classifications for the Town of Westminster

Soil Association (% of Town)	Breakdown	Description	Permeability	Water Table
Colton (12%)	Colton	Well and moderately well drained soils. Gravelly sandy loam with 3-8% and 8-15% slopes.	Rapid	Normally 72 inches
Peru-Marlow, Berkshire-Marlow, Becket-Skerry, Lyman-Tunbridge-Berkshire, Woodbridge-Paxton (82%)	Berkshire-Marlow	Well draining soil with steep slopes. Soil is extremely stony.	Moderate to moderately rapid	Normally 72 inches
	Lyman-Tunbridge-Berkshire	Very to extremely stony surface, stones below surface. Well draining to excessively well draining soil.	Moderately Rapid	Normally 72 inches
	Peru-Marlow	Moderately well drained to well drained soils. Rolling terrain with extremely stony soil.	Moderate	Seasonally High 18-42 inches
	Becket-Skerry	Moderately well draining soil to well draining soil. Rolling terrain with extremely stony soil.	Moderate	Seasonally High 18-42 inches
	Woodbridge-Paxton	Very steep, well drained soils on glacial outwash plains, terraces, deltas and escarpments.	Moderate	Seasonally High 18-30 inches
Bucksport-Wonsqueak Muck (6%)	Bucksport-Wonsqueak	poorly draining soil, severe ponding and flooding, wetland areas	Moderately slow	Seasonally High 6 inches

1. Descriptions of soils from *Interim Soil Report for Northwestern Worcester County Massachusetts*.

1.3.3 Hydrologic Conditions and Water Resources

1.3.3.1 River Basins

The hydrology of the Town of Westminster consists of river basins, rivers, streams, ponds and reservoirs. A majority of the Town lies within the Nashua River Basin, however smaller portions of the Town are located within the Chicopee River Basin and the Millers River Basin, as displayed in Figure 1-1, attached at the end of this report (prior to appendices).

1.3.3.2 Hydrology and Water Resources in the Nashua River Basin

The Nashua River is located in north central Massachusetts and south central New Hampshire. The river itself runs approximately 56 miles and has a drainage area that covers 538 square miles. The Nashua River Basin includes all or part of 27 cities or towns and ranges in altitude from 155-feet to 2,006 feet above sea level at Wachusett Mountain. The Town of Westminster falls within three (3) sub-basins which discharge to the North Nashua River in the Nashua River Basin. These sub-basins are the Flag Brook, Phillips Brook, and Whitman River sub-basins. The Nashua River Watershed Association and the Massachusetts Watershed Initiative - Nashua Team have put together a Nashua River Watershed 5 Year Action plan for 2003 to 2007. This plan includes specific information pertaining to these sub-basins, which is summarized below.

1.3.3.2.1 Phillips Brook Sub-Basin

Phillips Brook runs approximately 8 miles through the towns of Ashburnham, Westminster and Fitchburg, respectively. The drainage basin for Phillips Brook encompasses 15.8 square miles. This river is classified as a Class B water body and warm water fishery. Land uses within the Philips Brook Sub-Basin include 75-percent forest, 9-percent residential and 10-percent agricultural/open. A total of 1,040 acres within the basin is defined as Permanently Protected Land Area, and 481 acres is Limited Protection Land Area (MGL Chapter 61 Lands). There are currently two National Pollutant Discharge Elimination System (NPDES) minor discharge permits within the sub-basin, and both are located within Ashburnham.

1.3.3.2.2 Flag Brook Sub-Basin

Flag Brook runs approximately 2.7 miles and has a basin area encompassing 12.6 square miles, predominantly within the Town of Westminster. Flag Brook is considered a Class B water body. The Flag Brook Sub-Basin is a source of drinking water supply for the Fitchburg Water Department which also supplies the Town of Westminster. Two additional water withdrawal permits within the sub-basin are for the Wachusett Mountain Associates, which is permitted to withdraw 0.23 million gallons per day (mgd) of surface and groundwater and Custom Papers Group, which is permitted to withdraw 1.6 mgd of surface water from the Sawmill Pond. Land uses within the Flag Brook Sub-Basin include 71-percent forest, 10-percent residential and 7-percent water bodies.

A *Hydrologic Assessment of the Nashua River Watershed* was completed by Camp, Dresser and McKee (CDM) for the Massachusetts Executive Office of Environmental Affairs – Nashua River Basin Team, and dated June 2002. The Flag Brook Sub-Basin was identified as a "high-stressed" basin using Department of Environmental Management guidelines (now Department of Conservation and Recreation) in that the estimated net outflow from the sub-basin exceeds the estimated natural flow. It was noted that this basin does contain a series of multi-month reservoirs that are capable of storing large flows in the spring and holding them for use during low flows in the late summer months.

1.3.3.2.3 Whitman River Sub-Basin

The Whitman River runs 8.4 miles through Ashburnham, Westminster and Fitchburg, respectively. The total land area for the basin is 28.25 square miles and includes 72-percent forest and 10-percent residential land use. There are currently two water withdrawal permits within the basin. These are for the Intercontinental Recycling Corporation, which averages 1.25 mgd of surface water withdrawals from Snows Millpond located primarily in Fitchburg on the Westminster border and for the Westminster Golf Course, which withdraws surface water from Burnt Millpond.

1.3.3.3 Hydrology and Water Resources in the Chicopee River Basin

The Chicopee River Basin is located in central Massachusetts and includes a small portion of the Town of Westminster (approximately 7 square miles). The basin includes all of or part of 39 cities and towns.

The basin is approximately 723 square miles and ranges in altitude from 50-feet to 1,720-feet above sea level. The Town of Westminster is partially located within the Ware River Sub-Basin, which is the headwaters for the East branch of the Ware River. The branch begins at the Mare Meadow and Bickford reservoirs and travels southwest to the confluence with the Ware River. The Mare Meadow Reservoir and Bickford Reservoir are both listed as Class A waters as they supply drinking water to the Town of Fitchburg. The Ware River has been listed by the Office of Water Resources as "high stressed" due to the low discharge per square mile of watershed. A portion of this low flow has been attributed to the withdrawals by the City of Fitchburg and the out of basin recharge of this water.

1.3.3.4 Hydrology and Water Resources in the Millers Basin

The Millers River Basin is located in north central Massachusetts and a small portion of southwest New Hampshire. The basin includes all or parts of 18 towns and encompasses a drainage area of 389 square miles. The watershed is classified as hilly ranging in altitude from 200-feet to 1,500-feet above sea level. A small portion of the Millers River basin is located within the Town of Westminster, which includes five water bodies: Upper Reservoir, Greenwood Pond, Minott Pond South, Minot Pond, and Wrights Reservoir.

1.3.3.5 Water Supply Protection

Various public drinking water supply sources are located within Westminster, including three surface water bodies and nine groundwater wells. The surface water supplies consist of Meetinghouse Pond, Mare Meadow Reservoir, and Wachusett Lake. Water withdrawals from Meetinghouse Pond and Mare Meadow Reservoir receive treatment at the Fitchburg Regional Water Filtration Facility. Westminster obtains water supply from this facility through an intermunicipal agreement (IMA) with Fitchburg. This is detailed further in the Existing Water Supply chapter of this report.

In order to protect existing water supplies, both Fitchburg and Westminster have purchased land within the watersheds of the reservoirs in Town. According to the Master Plan, the City of Fitchburg owns approximately 1,557 acres and the Town of Westminster owns approximately 16 acres.

Surface water supply protection zones have been delineated based on the DEP Massachusetts Drinking Water Regulations for the three surface water bodies detailed above. These zones serve to protect the surface water resource from the detrimental effects of certain land uses and activities, and are detailed in Figure 1-2 of the CWMP (attached at the end of this report). The Zone A protection area consists of a region 400-feet from the edge of the reservoir and 200-feet from the edge of any tributary feeding the reservoir, as defined by the regulations. The Zone A for Meetinghouse Pond is located solely within Westminster. The delineated Zone A for both Wachusett Lake and Mare Meadow Reservoir are located within Westminster and extend into the neighboring communities of Princeton and Hubbardston.

The Zone B protection area is defined as the region extending one-half mile from the edge of the reservoir, unless bound by the edge of the watershed. Similar to the Zone A, the Zone B for Meetinghouse Pond is located within the limits of Westminster, while the Zone B for both Wachusett Lake and Mare Meadow Reservoir extend into the adjacent communities. It should be noted that a significant portion of the Zone B for Wachusett Lake is located within the Wachusett State Forest.

The final surface water body protection area is the Zone C, which includes the entire watershed draining to the reservoir.

Additional, non-community public water supplies were identified within Westminster, all of which withdraw groundwater through wells. The remainder of the community relies on private, on-site groundwater wells for water supply, as detailed in the Existing Water Supply summary.

In the absence of MA-DEP approved Zone II wellhead protection areas, these public water supply well locations have been assigned an Interim Wellhead Protection Area (IWPA). Wellhead protection areas serve to protect the recharge area around public water supply wells. A Zone II is a wellhead protection area that has been determined by hydrogeologic modeling and approved by the DEP. In cases where extensive studies have not been performed and there is no approved Zone II, an IWPA is established based on well pumping rates or default values. The minimum radius for the IWPA is 400-feet.

1.3.4 Hydrogeology

The bedrock geology for both the Nashua River Basin and the Chicopee River Basin was characterized by the United States Geological Survey (USGS) as Igneous and Metasedimentary Crystalline rock from the Paleozoic and Precambrian period. Reports indicated wells drilled 100 to 200 feet below ground surface within the bedrock typically yield 2 to 10 gallons per minute (gpm) for domestic uses and 20 to 150 gpm for industrial uses.

The surficial geology for the Town of Westminster, as characterized by the USGS, includes three distinct categories. A majority of the Town is characterized as till and bedrock materials. Areas of sand and gravel deposits, which represent the most productive aquifers, were identified in low lying areas near surface water bodies, specifically the tributaries to the Nashua River and the lakes or ponds located in the western portion of the Town. Small amounts of floodplain alluvium are located within the southwestern portion of the Town consistent with the FEMA designated 100-year and 500-year floodplains and wetland areas. The surficial geology within Westminster is illustrated in Figure 1-2 of this report.

1.3.5 Water Quality

The MA-DEP Division of Watershed Management completed Water Quality Assessment reports in accordance with reporting requirements of Section 305(b) of the Clean Water Act. Westminster is located at the confluence of three separate drainage basins, and therefore limited surface water quality studies have been completed within the Town. The following narrative summarizes the results of the DEP Water Quality Assessment program, specific to the Town of Westminster.

Surface water quality was reviewed for the Mare Meadow Reservoir which was found to have an undetermined trophic state and was also found to support the designated uses of recreational contact and aesthetics.

A Water Quality Assessment Report was prepared for the DEP Division of Watershed Management in 2000 to assess the conditions of the water quality in the Millers River. Two separate issues were noted during this assessment: the identification of noxious aquatic plants within a significant number of lakes, and the mercury impairment of water bodies. Four lakes within the Town of Westminster, including Greenwood Pond, Minott Pond South, Minott Pond and Wrights Reservoir, were placed on the 1998 303(d) list of impaired waterways due to the observation of very dense algae and aquatic plants. A Total Maximum Daily Load (TMDL) Study for phosphorus was completed by the DEP, as phosphorous is typically considered the primary nutrient known to accelerate eutrophication in freshwater systems. The existing phosphorus loads to these lakes and the target loads necessary to achieve water quality standards were calculated to determine a selected target phosphorus concentration in the waterways. Minott Pond was the only lake which had a developed phosphorus target lower than the current loading. The remaining three lakes were found to have levels that were naturally occurring. It was determined that management of phosphorus should be targeted by public education, watershed surveys, the development

of lake management plans and additional lake specific BMPs. These lakes are not listed as Category 5 waters – impaired waters as shown on the 2004 Proposed Integrated List of Waters. Mitigation plans resulting from these studies were not identified.

Wrights Reservoir has been listed as a Category 5 impaired waterway in the 2004 Proposed Integrated List of Waters due to the presence of metals, specifically mercury bioaccumulation within fish tissue. The source of the impairment is currently unknown, and is suspected to be related to atmospheric deposition. The MA-DEP has submitted an "alternative management strategy for selected waters or segments of waters that are impaired by mercury originating for atmospheric deposition" with the hopes of reducing the levels of mercury through implemented measures. However, the 2002 Water Quality Report indicated the Massachusetts Department of Public Health (DPH) Fish Consumption Board has recommended (1) "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body", and (2) "The general public should limit consumption of all fish from this water body to two meals per month."

Eutrophication and excessive weed growth were identified in Wyman Pond and resulted in the development of the "Wyman Pond Restoration Feasibility Study" prepared by Anderson-Nichols and Co., Inc in June 1983. Based on the report, the source of nutrients was determined to be from the surrounding watershed and most likely came from the residential development around the lake. While the development was found to make up 5-percent of the land area, the dense populations and contribution of on-site wastewater disposal systems were found to have the highest nutrient loading. Moderate concerns from erosion and sedimentation from the then expanding Wachusett Mountain were noted as well. The outcomes from this study focused on three issues: mitigating the impacts from wastewater disposal facilities, the development of watershed management alternatives, and the implementation of in-lake measures to reduce the effects of eutrophication. Westminster has installed municipal sewer systems in some dense neighborhoods on the eastern side of Wyman Pond to reduce nutrient loads to the pond. Other mitigation measures were not identified.

1.3.6 Wetlands or Species Habitats

There are two Estimated Habitats of Rare Wildlife (WH) in Westminster, based on rare species records maintained in the Natural Heritage & Endangered Species Program (NHESP) database. Resource areas and buffer zones in these habitats are within the jurisdiction of the local conservation commission under the Massachusetts Wetlands Protection Act Regulations (310 CMR 10). There are also three areas designated as Priority Habitats of Rare Species (PH) under the Massachusetts Endangered Species Act (321 CMR 10), based on NHESP records. These habitats include:

- WH 566/PH 236 is located in the northwestern corner of the Town within the limits of the Westminster State Forest. The wildlife habitat and priority habitats overlap and stretch into the Town of Gardner.
- PH 222 is located on the northeast edge of the Town. This estimated habitat surrounds a portion of Phillips Brook along the Ashburnham State Road and Potato Hill Road and stretches into the Town of Fitchburg.
- WH 7001 is located in the southeast corner of the Town within the Wachusett Mountain State Reservation. This estimated habitat is crescent shaped and located completely within Westminster's borders south of the "V" formed by West Princeton Road and Bolton road.
- PH 417 is located in the southeast corner of the Town within the Wachusett Mountain State Reservation. A majority of this priority habitat is located within the Town of Princeton; however, a small portion of the habitat is located along the border within Westminster.

There are twelve certified vernal pools within the Town of Westminster, according to the NHESP records, based on their guidelines for certification of vernal pool habitat. Six certified vernal pools are located within the Westminster State Forest, and along the western edge of the Whitmanville Reservoir. The remaining vernal pools are scattered throughout the Town. These certified vernal pools are protected if they fall under the jurisdiction of the Massachusetts Wetlands protection Act and are also afforded protection under the state Water Quality Certification regulations (401 Program), Title 5 regulations and Forest Cutting Practices. A majority of the certified vernal pools are located within or adjacent to wetlands areas.

A total of eighty NHESP potential vernal pools are located within the Town of Westminster. These locations are based on interpretations of aerial photographs and have not been verified; therefore, they are not included in the list of certified vernal pools.

1.3.7 Flood Plain Locations

The Federal Emergency Management Agency has provided flood insurance maps to delineate the areas inundated by 100-year and 500-year flooding. A majority of the flood hazard areas are associated with surface water bodies and the remaining are typically associated with wetland areas. Three FEMA designated flood hazard areas were identified within Westminster as illustrated in Figure 1-1. Zone AE is defined as an area inundated with 100-year flooding where the base flood elevations have been determined. Flood zone AE areas are located around many of the North Nashua River Tributaries including Flag Brook and Phillips Brook and the tributary from Tophet Swamp running alongside Route 2 to the Snows Millpond. The area surrounding Whitmanville Reservoir is also included in this designation. Zone A is identified as an area inundated with 100-year flooding where the base flood elevations have not been determined. Areas within Westminster identified as flood hazard Zone A include a portion of the Whitman River from Crocker Pond to the confluence with the North Nashua River and the areas surrounding a majority of the ponds and reservoirs located in the southwest portion of the Town.

The final flood hazard zone is identified as Zone X500, which is described as an area inundated by 500-year flooding, or areas "inundated by the 100-year flooding with average depths of less than 1-foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding." In Westminster, Zone X500 is found concentrated around wetland areas bordering or feeding major surface water bodies.

1.3.8 Environmental Hazards

Environmental Hazards in the Town of Westminster were identified as sites where known releases of oil and hazardous materials have occurred, or locations where there is potential for release of oil and/or hazardous materials. These sites include:

- State spill sites regulated by the MA-DEP under the Massachusetts Contingency Plan (310 CMR 40.0000).
- Solid Waste Landfills.

A review of the searchable site reportable release database maintained by the DEP Bureau of Waste Site Cleanup as updated December 20, 2004 was completed for the Town of Westminster to identify sites where known spills have occurred and have been documented with the DEP. Based on the database review, a total of 47 spills of oil and/or hazardous materials were identified. Response actions have been completed at thirty five of the sites lists, and four of the sites have been linked to another release and the release tracking number (RTN) has been closed. The remaining sites are open under the Massachusetts Contingency Plan. Table 1.5 lists these sites along with RTN, chemicals released and current status.

Table 1.5
Summary of Active MA-DEP Reportable Release Sites (as of December 2004)

Site Name, Address, and Release Tracking Number (RTN)	Chemical Released	Date of Release	Current Status
Heritage Home Builders 124 East Road RTN 2-15142	Oil	3/1/2004	Unclassified – The site has not reached the Tier Classification Deadline.
11 Main Street (URAM for Water Main Installation) RTN 2-14502	Oil	11/19/2002	The site has been classified as a Tier 2. To date, a Phase II Comprehensive Site Assessment has been completed to assess risks to public health, welfare and the environment.
F&M Service 78 Main Street RTN 2-11550	Oil	12/31/1996	The site has been classified as a Tier 2. To date, a comprehensive Site Assessment has been completed, and remedial action alternative has been identified and installed. The Site is currently under Phase V conducting operation, maintenance and monitoring for the selected alternative.
Massachusetts Electric Company Gatehouse Road –Pole #9 RTN 2-15469	Unknown	11/06/2004	Unclassified – The site has not reached the Tier Classification Deadline.
Rte 2 and Rte 140 RTN 2-13766	Oil	4/4/2001	The site has been classified as a Tier 1D Site. The status of response operations is unknown.
Cresticone Decontone Route 2A RTN 2-165	Haz Mat	7/25/1984	The site is classified as a Tier 1B. The Site is currently under Phase V conducting operation, maintenance and monitoring for the selected alternative.
Mobil Station 21 Village Inn Road RTN 2-1017	Unknown	7/12/1993	The Site is currently under Phase V conducting operation, maintenance and monitoring for the selected alternative. The remedial system relies on active operation and maintenance.
Overlook Road MA Division of Fisheries and Wildlife	Haz Mat	11/23/2004	Unclassified – The site has not reached the Tier Classification Deadline.

A total of seven solid waste sites have been identified in Westminster based on the Solid Waste Facility Database provided by the MA-DEP Bureau of Waste Prevention – Division of Planning and Evaluation. A summary of these solid waste facilities, their locations, and type is shown in Table 1.6.

Table 1.6
Summary of Solid Waste Facilities

Solid Waste Facility	Location	Facility Type	Comments
Mass Natural Compost Site	65 Bean Porridge Hill Road	Compost Site	Facility opened in 1990
North Central. Correctional Institution Dump	Chapel Street	Demolition Landfill	Unlined Landfill, Facility opened in 1978. Facility stopped operation in 1984.
Unconfirmed Site	Ellis Road	Epic Site	Unlined
Westminster Landfill	Knower Road/Frog Hollow Road	MSW Landfill	Unlined landfill. Facility stopped operation in 1971.
Leominster State Forest Dump	Fitchburg Road (Route 31)	MSW Landfill	Unlined
Fitchburg-Westminster Compost	101 Fitchburg Road (Route 31)	Compost Site	
Fitchburg-Westminster Landfill	101 Fitchburg Road (Route 31)	MSW Landfill	Lined Landfill. Facility opened in 1971. Facility currently operating.

Known locations of underground storage tanks (USTs) were recorded and mapped by the U.S. Environmental Protection Agency through a contract with Camp, Dresser and McKee Federal Systems, Inc. Tabular information on tank sites was obtained from the Massachusetts Department of Public Safety's Division of Fire Protection Tanks database. Thirteen USTs are located within the Town of Westminster. Eight USTs are located within the commercially or industrially zoned areas, and the remaining are located in residential areas; however, some are associated with non-residential uses such as the Westminster Highway Department, Westminster Golf Club, and a local poultry farm. Two USTs were found to be located within the Zone C of Meetinghouse Pond.

2. Existing Wastewater Management

2.1 Introduction

The Town of Westminster operates a municipal sanitary sewer system that serves a portion of the community. The remainder of the community is served by standard (or non-standard alternative) on-site wastewater disposal systems, often referred to as septic systems. There are no centralized wastewater treatment facilities in Town. The municipal sewer system discharges to the City of Fitchburg for treatment and disposal. The Town entered into an intermunicipal agreement (IMA) with Fitchburg that established the requirements and limitations for this wastewater disposal. The centralized treatment provided for through the IMA is only one facet of the Town's strategy for wastewater management. The Town is committed to developing a plan that will strive to manage wastewater in a manner that does not inhibit planned development, does not encourage unintended sprawl, and protects environmental resources and public health to the maximum extent possible.

2.2 Municipal Sanitary Sewer System

The Westminster municipal sanitary sewer system has expanded since the early 1980's to serve many residential, commercial, and industrial users in Town with two, separate wastewater collection systems. The systems are operated and maintained by the Town Sewer Department, and serve approximately 19-percent of the residences in Town (as of January 2005). This section provides background and summarizes the sewer user characteristics, physical components, and flow volumes of each collection system.

2.2.1 Sewer System History

In 1971, the Massachusetts Water Resources Commission (WRC) Division of Water Pollution Control determined that Round Meadow Pond was being polluted by development in the Town Center through wastewater discharges to storm drains that discharge to the pond. The WRC directed the Town to take action.

Construction of sanitary sewers was originally investigated as a potential solution. A *Report on Wastewater Collection and Disposal Facilities* was prepared by S E A Consultants Inc. (S E A) in 1975 to "develop a water pollution abatement program for the (Town)," which included "the immediate serving of known sources of pollution and a long range solution for serving the remainder of the Town." The report established a phased sewer program with the priority areas being Town Center and the Wyman Pond area to improve water quality in Round Meadow Pond and Wyman Pond. The report concluded that it was not economically feasible at that time to provide sewers to the Wyman Pond area. It also recommended establishing an agreement with the City of Fitchburg to discharge wastewater to that City's treatment facilities. This could be accomplished with an interceptor sewer connecting Town Center to the West Fitchburg Treatment Facility. The report cited a Nashua River Basin Plan that prohibited new discharges into the Whitman River, regardless of quality, which effectively eliminated in-town treatment as an option. An environmental assessment report was prepared by S E A in 1977 to evaluate the environmental impact of the project proposed in the prior report and to comply with facilities planning requirements.

The Town selected DuFresne-Henry, Inc. to evaluate the recommended plan prepared by S E A and investigate other options that may be available. DuFresne-Henry, Inc. prepared a *Facilities Planning Report for Wastewater Collection and Treatment Facilities* in 1980 (revised 1982) that followed the recommendations made by S E A. It concluded that a regional solution was appropriate to address the

existing problem areas due to site limitations. The report concluded that transporting wastewater from the Town Center area to the West Fitchburg Wastewater Treatment Facility was the optimal solution.

The original sewer system constructed in 1983 included service to the Wachusett Mountain Ski Area, which was expanding and in need of sewer service. The system extended from Fitchburg along Route 2A (State Road East) to Depot Road, Narrows Road, Stone Hill Road, East Road, Gatehouse Road, and Mile Hill Road. The Whitman River Pump Station was installed at that time to convey wastewater over the Whitman River to Fitchburg. A pump station at Narrows Road was installed as well. Additional sewers were constructed further along Route 2A to serve the Town Center area in 1984.

In 1983 Anderson-Nichols & Company, Inc. prepared a *Wyman Pond Feasibility Study – Draft Final Report* for the Massachusetts Department of Environmental Protection (DEP, but at that time called the Division of Environmental Quality Engineering or DEQE) Division of Water Pollution Control to establish a comprehensive program for restoring and maintaining the water quality of Wyman Pond. Among other measures, Anderson-Nichols recommended reduction of on-site wastewater discharges by providing pressure sewers to the high-density shoreline development. These sewers would connect to the existing sewer on East Road and Gatehouse Road. No immediate actions were taken to implement this particular recommendation.

Between 1989 and 1999, small segments of new sewer were extended from the Town Center area, including an extension along West Main Street. In 1991, a second sewer connection to Fitchburg was installed on Route 31 (Fitchburg Road). This small segment of sewer was constructed to serve an existing industrial business.

The most recent sewer construction was completed in 2001. These projects included additional sewers off West Main Street near Town Center and sewers in the Carter Road – Frog Hollow Road neighborhood. Low pressure sewers were also constructed on several streets off East Road to serve homes in the Wyman Pond area. A map showing the extents of the existing sewer system is attached to the end of this report (prior to appendices) as Figure 2-1.

2.2.2 Wastewater Flow

Wastewater flow generated within the municipal sewer system in Westminster discharges to the Fitchburg collection system at two locations. The discharge points are both metered by Fitchburg. Virtually all of the wastewater flow is measured at the meter located at the Montachusett Regional Vocational Technical School (Monty Tech) along Route 2A. There is one industrial user that discharges to Fitchburg at the other location, which is along Route 31 (as of January 2005). The Town does not maintain records of the flow measurements at the meter located along Route 31, as that user is billed directly by Fitchburg. Therefore, the following discussion including wastewater flow, existing users, and sewer capacity will focus primarily on the system that discharges at the Monty Tech meter. This system is referred to as the Whitman River collection system. Municipal wastewater flows from this system averaged approximately 135,000 gallons per day (gpd) between January 2003 and December 2003, based on data collected at the meter located at Monty Tech, and provided by the Town. Between January 2002 and December 2002, wastewater flows at the same meter location averaged approximately 114,000 gpd.

S E A prepared a *Municipal Wastewater System Capacity Analysis* (Capacity Analysis) for the Town in August 2004, which is attached as Appendix A to this report. The report summarizes existing information pertaining to the wastewater system and provides an estimate of its remaining capacity. The discussion of existing and future wastewater flows that follows references the results of the Capacity Analysis.

2.2.3 Existing Flow

The existing users of the municipal sewer system primarily consist of individual homeowners. The 2002/2003 Westminster water and sewer billing records indicate that there are approximately 500 domestic users, 34 commercial users, 6 industrial users, and 8 municipal or other users. There are four non-domestic users that generate large volumes of wastewater, which impact daily and seasonal variations experienced in the Town's wastewater collection system. These users are summarized in the following table:

Table 2.1
Large Sewer Users

User	Type	Estimated Average Daily Flow[1] (gpd)
Simplex Time Recorder Company	Industrial	15,000
Advance Coatings	Industrial	6,900
State Road Partnership	Commercial	4,700
TRW Automotive	Industrial	5,800
	Total	**32,400**

1. Estimated average daily flow obtained from 2002/2003 Westminster water and sewer billing records.

The estimated wastewater flow generated by these large users is based on the 2002/2003 Westminster water and sewer billing records. The records identify water use for all residences, businesses, and municipal/other users in Town that have a sewer service.

For each class of user, wastewater flow was estimated from water use based on typical assumptions and industry guidelines, as described in the Capacity Analysis (Appendix A). The estimated average daily wastewater flow generated by domestic users, commercial/other users, and industrial users is 52,000 gpd, 39,000 gpd, and 29,000 gpd, respectively. This yields an average daily wastewater flow (exclusive of infiltration/inflow) of approximately 120,000 gpd for the Town. The flow measured at the meter located at Monty Tech is greater because it includes increased wet weather flow due to infiltration and inflow (I/I) that occurs within the sewer system, as detailed subsequently in this chapter. The large users identified in Table 2.1 represent about 27 percent of the total wastewater generated within Town. The flow generated by the Wachusett Mountain Ski Area, another large user, is significant during the spring season; however, when the ski resort is not operating, flows are greatly diminished.

2.2.4 Future Flow from Currently Sewered Areas

There are a number of properties in Town with access to the existing municipal sewer system that are entitled to connect but have not done so (i.e. betterments have been assessed but no house service has been installed). The Capacity Analysis accounted for these potential sewer users because under current policies, the Town has an obligation to provide them with municipal wastewater service. The Wastewater Management Needs Analysis chapter of this report provides further details of this obligation.

As described in the Capacity Analysis, S E A estimated wastewater flow from properties that had been assessed a betterment but had not connected to the sewer system at the time of the analysis. This was accomplished using betterment records provided by the Town and the 2002/2003 Westminster water and sewer account records. S E A also reviewed sewer construction plans and record plans provided by the Town for more recent sewer expansion projects and estimated wastewater flow from properties that were given sewer services but had not yet connected to the system at the time of the analysis.

Additional relevant documents were also reviewed to determine potential impacts on sewer capacity from existing users. A Sewer Improvements Agreement has been executed between Westminster and Simplex Time Recorder Co., an existing business in Town. The agreement indicates that this industrial user has the right to increase its wastewater discharges to the municipal sewer system by 50,000 gpd at any point in the future. Further details of this agreement are provided in the Capacity Analysis.

The potential average daily sewer flow from currently sewered properties and Simplex Time Recorder Co. totals approximately 96,200 gpd based on the results of the Capacity Analysis. The estimates are summarized in the following table:

Table 2.2
Future Flow Estimates

Property	Number	Average Flow Rate	Flow
Residential	196	190 gpd	37,240 gpd
Commercial	7	1,077 gpd	7,539 gpd
Municipal	4	343 gpd	1,372 gpd
Industrial	1	---	50,000 gpd
Total	**208**		**96,151 gpd**

1. Based on 2002/2003 data.

2.2.5 Flow from Future Sewered Areas

At the time of the Capacity Analysis, the Westminster Planning Board identified a development that had been granted approval for construction within Town. It was referred to as The Village at Old Mill. The development proposed to connect to the sewer system and the average daily wastewater flow was estimated to be approximately 17,490 gpd by BSC Group Inc. in a previous evaluation. This flow was included in the Capacity Analysis.

The Planning Board also cited a Chapter 40B - Comprehensive Permit development planned along East Road in Westminster. The proposed development plans to connect to the municipal sewer system. It consists of 164 proposed units and would generate a considerable wastewater flow.

2.3 Wastewater Collection Systems

As detailed in the previous section, the Westminster municipal sewer system consists of two separate collection systems. These are the Whitman River collection system and the Route 31 collection system. Both systems discharge directly to the Fitchburg municipal sewer system at separate locations for treatment and disposal and are metered as they enter into Fitchburg. Figure 2-1 of this report illustrates the extent of the Westminster municipal wastewater collection systems.

2.3.1 Route 31 Wastewater Collection System

The Route 31 collection system is located entirely within Route 31, along the eastern boundary of Westminster where Route 31 proceeds into Fitchburg. It is a small system that serves the Pinetree Power Company, located along Route 31. This industrial user generates approximately 500 to 600 gpd of wastewater, based on the 2003 Westminster water and sewer billing records.

The system consists of approximately 1,700 linear feet of 8-inch diameter PVC gravity sewer. Existing plans indicate the sewer system was constructed around 1991.

2.3.1.1 Flow Measurement

As previously identified, the Route 31 collection system is measured at a meter located in Fitchburg. The Town indicated that the meter is read by Fitchburg and the user is billed directly by the City.

2.3.1.2 Hydraulic Capacity

The drawings provided by the Town for the Route 31 sewer are design plans and do not represent as-built conditions. Therefore, the actual slopes of the various reaches of sewer are uncertain unless a field survey is performed. Without knowing the slope, a conservative assumption of the minimum capacity can be determined by assuming the minimum recommended slope for 8-inch diameter sewer pipe. Using Manning's Equation, a Manning's roughness coefficient of 0.009 for PVC pipe, and a slope of 0.004, the calculated minimum capacity of the sewer is approximately 500 gallons per minute (gpm) or 720,000 gpd, well above the average sewer flows of the user.

2.3.2 Whitman River Wastewater Collection System

The Whitman River collection system extends to the west from the largest pump station in the Town, the Whitman River Pump Station (also referred to as Pump Station 3) located on the eastern border of the Town, to the Kendall Court Pump Station and collection area. From that point, the collection system extends to the southwest, to the Frog Hollow and Ellis Road Pump Stations and collection areas, and to the south, to the Wachusett Mountain Ski Area and Pump Station No. 1 at Mile Hill Road. The system contains eight separate pump stations and three separate low-pressure sewer systems. The oldest portion of the collection system was constructed in 1983 and includes the pump stations, gravity lines, and force mains installed to the south towards Wachusett Mountain. Table 2.3 summarizes the pump stations within the sewer system.

Table 2.3
Wastewater Pumping Stations

Description	Year Constructed	Type	Capacity	Force Main Diameter
Whitman River Pump Station	1983	Flooded Suction	500 gpm	6-inch
Narrows Road Pump Station	1983	Flooded Suction	220 gpm	6-inch
Mile Hill Road Pump Station	1983	Flooded Suction	200 gpm	6-inch
Val Road Pump Station	1984	Submersible	48 gpm	3-inch
Wachusett Drive Pump Station	1984	Submersible	48 gpm	3-inch
Frog Hollow Road Pump Station	2002	Suction-Lift	120 gpm	4-inch
Ellis Road Pump Station	2002	Suction-Lift	120 gpm	4-inch
Kendall Court Pump Station	2002	Suction-Lift	120 gpm	4-inch

There is approximately 68,016 feet (12.9 miles) of gravity sewer within the Whitman River collection system, as of 2005. This does not include privately owned components such as sewer service connections. Approximately 2,000 feet of gravity sewer consists of ductile iron pipe, and the remainder is PVC pipe. There is approximately 13,000 feet of sewer force main. Approximately 800 feet of force main consists of ductile iron pipe, and the remainder is PVC pipe. There is approximately 8,600 feet of low-pressure sewer main, which consists entirely of PVC pipe. The extent of sewers is depicted in Figure 2-1.

The various diameters and total lengths of gravity sewer mains within the Whitman River collection system as of 2005 are identified in Table 2.4 below. This information is based on sewer design and record drawings provided by the Town.

Table 2.4
Gravity Sewer Mains - 2005

Sewer Pipe Diameter (Inches)	Total Length (Feet)	Percent of Total
8	33,316	49.0%
10	12,542	18.4%
12	10,585	15.6%
15	9,635	14.2%
18	1,938	2.8%
Total	**68,016**	

2.3.2.1 Flow Measurement

The Whitman River collection system is measured by a meter located at Monty Tech along Route 2A. This meter is a flow totalizer located within a manhole that measures flow through a 12-inch Palmer-Bowlus flume. There is also a flow meter with a circular chart recorder located inside the Whitman River Pump Station that measures instantaneous flow and total flow through an 8-inch Palmer-Bowlus flume installed on the influent line into the pump station wet well. The digital flow meter was installed in July 2002 and the chart recorder was installed in December 1982.

The capacity of the 8-inch flume is identified in the *Isco Open Channel Flow Measurement Handbook, Fifth Edition* as approximately 310 gpm. It is suspected that peak flows in the system exceed the capacity of this flume. Due to the capacity limitations of the flume, the instantaneous flow readings measured by the chart recorder in the pump station cannot be relied on to develop a peaking factor for the sewage flows.

During site visits to the Whitman River Pump Station on November 7, 2003 and on February 27, 2004, minor debris had accumulated just upstream of the pump station influent flume. The debris was impacting the flow pattern in the flume, which may cause inaccuracy in the readings taken by the flume. Additionally, both flow meters rely on the application of ultrasonic transducers to measure the height of wastewater in the throat of the flume. The Town provided documentation of the last meter calibration in April 2005. It was noted that the pump station meter was reading approximately 10-percent greater than actual flows at the time of the calibration.

2.3.2.2 Historical Record of Wastewater Flows

The Town maintains historical records of the flow meter readings at the meter located at Monty Tech along Route 2A. The meter is typically read weekly, and the average daily flow can be determined from the total flow measured. The average daily flow measured at the meter was approximately 135,000 gpd between January 2003 and December 2003, as previously detailed in this chapter. Between January 2002 and December 2002, wastewater flows at the same meter averaged approximately 114,000 gpd.

Flow measured at this meter includes I/I, as previously detailed. Therefore, the measured flow rates vary significantly during the course of the year. The maximum average daily flow in 2003 occurred during a seven-day period in March and was approximately 204,000 gpd. The minimum average daily flow in 2003 occurred during a seven-day period in December and was approximately 87,000 gpd.

2.3.2.3 Estimation of Infiltration and Inflow

Extraneous flows in wastewater collection systems can be attributed to many different sources, often classified into the two larger groups of I/I. Infiltration includes flows entering the wastewater collection system through defective pipes, pipe joints, connections or manhole walls. Inflow includes flows from, among other sources, direct stormwater runoff through combined sewer connections, area drains, catch basins, roof leaders and other stormwater control devices, or indirect flow discharged from cellar and foundation drains, or from springs and swampy areas. The indirect flows specified above are often steady sources of flow and normally measured along with infiltration.

The extent of the extra flows depends on the quality of material and workmanship in constructing the sewers and building connections, the character of the maintenance, and the elevation of groundwater compared with that of the sewers. The amount of I/I reaches a maximum during heavy rains, when direct inflow is occurring due to increased surface runoff rates and maximum infiltration is also occurring due to increased groundwater elevations and penetrations.

Earth Tech, Inc. has been performing on-going I/I investigations for the Town. A summary letter submitted to the Town in October 2003 recommended closed circuit television inspection and smoke testing in specific areas based on flow measurements and observations at locations throughout the sewer system. Earth Tech summarized the results of the recommended television inspection program in a letter to the Town in July 2004. The letter recommends minor rehabilitation work; however, no significant I/I sources were located in the inspected sewer pipe. Although it appears that substantial defects in the sewer system have not been identified to this point, Earth Tech will be providing the Town will an overall summary of the I/I investigations and recommended rehabilitation procedures in the near future.

Therefore, a complete inventory of the information required for a full analysis of I/I was not collected for this project. However, based on the plans for the existing sewer system, the flow records from the permanent flow meter at the Whitman River Pump Station, the flow meter readings from the Route 2A discharge meter into Fitchburg, and our conversations with Town personnel, general conclusions for planning purposes can be drawn regarding the I/I into the Town system. The results of the analysis show that the Whitman River collection system sees a pattern of I/I typical of most community sewer systems.

Flow records were obtained from the Whitman River Pump Station for the period between November 2002 and October 2003 to estimate infiltration in the Town collection system. Based on these records, the minimum instantaneous flow through the Whitman River Pump Station, as measured during the night hours over the dry period of the year (July through October), averaged approximately 28,800 gpd. It is assumed that during the night hours, when the instantaneous minimum flow through the pump station occurs, the wastewater flow is typically from twenty-four hour industrial or commercial sources. Where detailed information regarding overnight use is not available, between 60 to 90 percent of dry weather overnight flows is assumed to be I/I, according to MA-DEP *Infiltration and Inflow Guidelines*, 1993. The range is offered to take into consideration the age and configuration of the collection system (extents and number of pump stations) and is attributed to infiltration. The Westminster collection system is a small sized system, constructed of relatively new materials; therefore, it is appropriate to use the lower value of the range (60 percent). It is estimated that the average daily infiltration rate during dry periods (summer/fall) is approximately 17,000 gpd. During wet periods (associated with increased ground water elevations) the overnight flow rates were approximately 50,000 gpd; therefore, the estimated average daily infiltration rate during wet periods is approximately 30,000 gpd.

An average infiltration rate was developed for the Town sewer system expressed as gallons per day of infiltration per inch-diameter-mile of gravity sewer pipe. The infiltration rate was calculated in this format to compare with a recommended value provided in *TR-16 - Guides for the Design of Wastewater*

Treatment Works of 250 gpd per inch-diameter-mile. This value is provided as a guide for planning new sewer system construction. Using an infiltration rate of 30,000 gpd, the Town system contributes 227 gpd per inch-diameter-mile of sewer pipe on average. In general, this infiltration rate is low, as it reflects the young age of the Town system.

Inflow is the component of wastewater flow directly associated with rainfall and snowmelt. Inflow can be seen on flow charts as changes in the pattern of daily flows. This is caused by the flow rates in the sewer changing in relation to precipitation. The charts obtained do not exhibit any dramatic changes in flow patterns and the system does not appear to be significantly influenced by inflow.

The conclusions regarding infiltration appear to be consistent with readings obtained at the Whitman River Pump Station during the overnight pump test performed by S E A for the Capacity Analysis on February 27, 2004 and described in the following section of this chapter. The instantaneous flow rates recorded during the pump test ranged between 30 and 50 gpm, which equals 43,200 and 72,000 gpd, respectively. The average overnight flow rates obtained from pump station flow records during wet periods were approximately 50,000 gpd, which is within the recorded range. In conversations with the Town DPW Director, the smoke testing program performed by Earth Tech did not yield a significant number of inflow sources; however, it is suspected by the DPW Director that more exist based on the Town's observations of sewer system response to wet weather.

2.3.2.4 Whitman River Pump Station

The Whitman River Pump Station is located on the north side of Route 2A at the Whitman River crossing, west of the intersection with South Ashburnham Road. The Whitman River Station pumps nearly all of the Town's wastewater over the Whitman River and along Route 2A to the primary connection with the Fitchburg interceptor. The station consists of an 18-inch diameter PVC intake pipe with a flow meter, two interconnected wet wells, a dry well that houses control panels, and two 25-horsepower pumps. The pump station discharges through a 6-inch diameter PVC force main, approximately 2,700 feet in length. The pump station wet wells and pumps were upgraded in the spring of 2000, which was funded by Simplex Time Recorder Co. The pump station upgrade plans were prepared by Daylor Consulting Group Inc. and are dated April 1999.

S E A performed a pump test of the Whitman River Pump Station in 2004 to provide an independent assessment of current pumping capacity. The results are summarized within this section of the chapter.

2.3.2.4.1 Intake

The 18-inch PVC pump station intake pipe, if flowing full, is capable of delivering flows greater than 2.5 million gpd (Using Manning's Equation, a minimum slope of 0.0012, and a Manning's Roughness Coefficient of 0.009). The intake size is more than enough to handle the largest peak hour flows that can be anticipated within the system using the most conservative peaking factors based on TR-16.

2.3.2.4.2 Wet Wells

The intake enters the older of the two wet wells at approximately elevation 670 (NGVD). The second wet well was added in the upgrade that was performed in the spring of 2000. Both wet wells measure six feet in diameter and are connected by a seven-foot length of 18-inch PVC pipe, based on dimensions provided in the design drawings.

A level gauge located in the pump station indicates that the pump begins operating when the level inside the wet well reaches approximately 40-inches and continues pumping until the level drops to approximately 20-inches. This gauge was inspected during the pump test, which revealed that these levels are approximate. This operating range, or drawdown, appeared to be nearer to 18-inches, which is

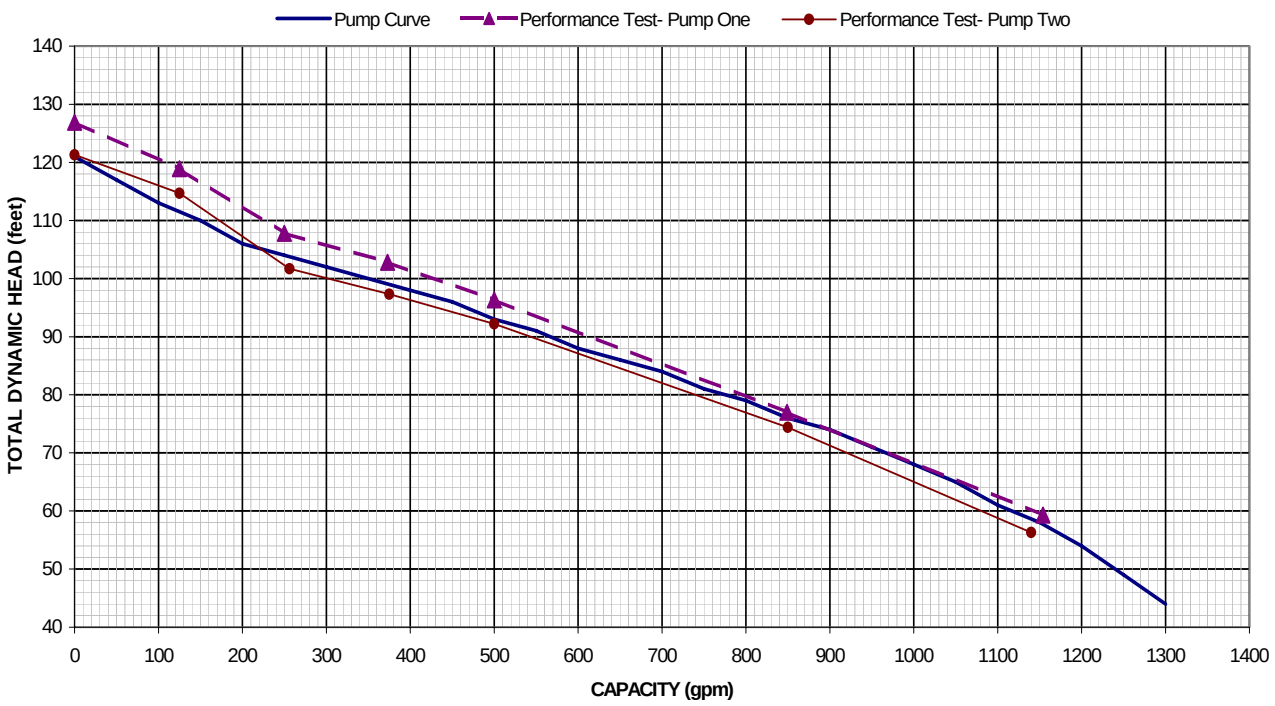
consistent with a physical measurement taken during the pump test from above the wet well. The pumped volume was calculated from these measurements to check the meter accuracy. The pump station upgrade plans identify the dimensions of the tandem wet wells and the connecting pipe. Based on these dimensions, the volume is approximately 657 gallons. The additional flow entering the wet well while the pump was operating during the test was also calculated. Observations during the test indicated the average flow entering the wet well was 40 gpm. With an average cycle time of 1 minute 15 seconds, the additional volume is 50 gallons. This yields a calculated pumped volume of 707 gallons for each pump test. This value is slightly higher than the range of measured volumes, which could be due to the difference between the dimensions shown on the design drawings and the final installed configuration.

Wet wells are typically designed for average fill times of 30 minutes or less and a reasonable number of pump starts per hour (TR-16). Longer fill times tend to cause odor problems and excessive corrosion. Frequent starts cause excessive wear on the pump equipment. The wet wells at the Whitman River Pump Station maintain sufficient fill times when flow is greater than 23 gpm (33,000 gpd). Flows do not drop below that rate for any extended period of time. Pump manufacturers typically recommend less than ten pump starts per hour for the average daily flow. Ten starts per hour equates to an average daily flow of 117 gpm (168,000 gpd), which is greater than average daily flow measured at the meter located at Monty Tech. Therefore, the wet wells provide sufficient storage capacity for the Whitman River Pump Station.

2.3.2.4.3 Pumps

Two 25-horsepower pumps, model 4NNT from Cornell Pump Company, were installed with 10.09-inch diameter impellers as part of the spring 2000 upgrade. The pumps have a shutoff head of 120 feet and are most efficient at 750 gpm and 80 feet of head. The manufacturer tested the performance of each pump on October 19, 1999, before shipping the pumps to the site. Figure 2-2 shows that each pump performed at levels within the manufacturer's pump curve.

Figure 2-2
Pump Performance Curve



Single speed pumps will pump at any rate along the pump curve that corresponds to the amount of head, or resistance, that the pumps experience. More flow can be pumped when there is less head to pump against. The total dynamic head is a result of three components: static head, pressure head, and friction head. In other words, the maximum flow rate of the pumps depends upon how high uphill the flow must be pumped, the pressure within the pipe at the discharge point, and the physical obstacles that impede flow along the length of the force main.

On March 13, 2000, R.H. White Construction Co. performed a pump test of the newly installed pumps at the Whitman River Pump Station to determine their capacity. A draw down test was performed in which R.H. White recorded a pump capacity of 400 gpm at a total dynamic head of 93.5 feet. It is assumed that this represents the individual capacity of each pump. Daylor Consulting Group, Inc. summarized the test results and clarified that the measurements taken during the test were "very approximate and the pumps easily could have pumped more." Daylor Consulting certified the pump station capacity at 500 gpm.

2.3.2.4.4 Pump Test Results

A pump test was conducted by S E A on February 27, 2004 between 3:00 AM and 5:30 AM to obtain a current assessment of capacity. During the pump test, the total flow entering the station wet well was measured at the end of each pump cycle. This provided the volume that was pumped during each cycle, including flow entering the wet well while the pump was operating. The pump station operates by alternating the two existing pumps on each cycle; therefore, six tests were run to provide several sets of data for each pump. The average pumped volume during the six tests was 680 gallons. The average pump cycle time was 1 minute 15 seconds.

The following table summarizes the results of the six tests:

Table 2.5
Whitman River Pump Station
Pump Test Results

Pump Cycle	Pump No.	Time Start	Time Stop	Elapsed Time	Totalizer Reading at End of Cycle (Gallons)	Pumped Volume (Gallons)	Capacity (gpm)
1	2	0:00:18	0:01:32	0:01:14	83,932,920	--	--
2	1	0:00:54	0:02:09	0:01:15	83,933,580	660	**528**
3	2	0:00:31	0:01:51	0:01:20	83,934,280	700	**525**
4	1	0:00:25	0:01:41	0:01:16	83,934,950	670	**529**
5	2	0:00:34	0:01:50	0:01:16	83,935,620	670	**529**
6	1	0:00:14	0:01:27	0:01:13	83,936,320	700	**575**

As the table indicates, the pumped volume was available at the end of the second pump cycle; therefore, the pump capacity was calculated five times. The capacity of each pump cycle is consistent except for the sixth. The sixth cycle should be removed from the data, and the remaining results should be averaged to determine a representative capacity for the pump station. This calculates to approximately 528 gpm. As a conservative approach, 500 gpm should be considered the capacity of the pump station.

The pump test was concluded with a test of both pumps running together. The wet well was allowed to fill to a level of approximately 50-inches. The measured pumped volume was approximately 1,050 gallons and the pump cycle time was 1 minute 41 seconds. This yields a capacity of 624 gpm with both pumps running.

2.3.2.5 Fitchburg Interceptor

The interceptor sewer that receives flow from the Whitman River Pump Station proceeds along Route 2A into Fitchburg towards Route 31. The Town does not have any drawings indicating the layout, pipe material, or age of the interceptor.

The *Draft Wastewater Pumping Station 3 Evaluation Report,* prepared by Earth Tech in September 1996 includes a capacity evaluation of the Fitchburg interceptor. The interceptor was investigated for a distance of approximately 9,500 feet into Fitchburg to determine its capacity limitations. Based on the diameter, slope, and roughness coefficient values for specific reaches of the interceptor included in the report, the maximum capacity was estimated by Earth Tech to be approximately 760 gpm. The evaluation indicates that approximately 3,600 l.f. of 8-inch and 12-inch gravity sewer would need to be replaced at a greater slope or with larger diameter sewer to increase capacity.

2.4 Sewer System Operation and Maintenance

2.4.1 Intermunicipal Agreement

The Town of Westminster does not currently have a centralized location for the treatment and disposal of wastewater generated within the community. Therefore wastewater collected by the Town wastewater collection system is transported to the City of Fitchburg for treatment and disposal. The basis for this arrangement is an Intermunicipal Agreement (IMA) that defines the terms and conditions for the transport, treatment and disposal of wastewater within Fitchburg. The original IMA, executed in 1983, was created to provide for the discharge of wastewater from the Mount Wachusett Ski Area and other properties along the route. The IMA was amended in 1991, 1995, and 1998 to increase the allowable

amount of flow discharged to Fitchburg and to add an additional connection to the Fitchburg sewer system.

2.4.1.1 IMA Conditions

The current IMA, revised in 1998, provides a number of conditions under which the Town must abide to allow for continued discharge of wastewater to Fitchburg. These conditions encompass basic regulations, flow limitations, and cost bases. Specific conditions regarding key sections of the existing IMA are as follows:

1. The Town may discharge up to 320,000 gpd to Fitchburg. Of this amount, 250,000 gpd may be discharged through the Route 2A (Monty Tech) metering station and 70,000 gpd through the Route 31 metering station. The flow values expressed in the IMA are average daily flows to be based upon a minimum measuring period of 28 days.

2. The Route 2A metering station discharges to the East Fitchburg Waste Disposal Plant. The Route 31 metering station originally discharged to the West Fitchburg Waste Disposal Plant and has been redirected to the East Fitchburg Waste Disposal Plant. A connection charge of $3.00 per gallon for every gallon of approved capacity is required to discharge to the Route 31 metering station. This charge applies to capacity purchases beyond 252,000 gpd, as provided for in the 1991 amended IMA up to the 320,000 gpd in the 1998 amended IMA. Payment shall be made in minimum increments of $3,000 based on 1,000 gallons of approved capacity and shall be rounded to even thousand gallon increments. The $3.00 gpd charge is subject to a prorating using Engineering News Record indexing after five years.

3. The wastewater must be of Normal Strength quality. The constituent pollutants of Normal Strength wastewater are defined as wastewater containing less than 250 milligrams per liter (mg/L) of measured average 5-day Biochemical Oxygen Demand (BOD_5) and 300 mg/L Total Suspended Solids (TSS). Wastewater above the Normal Strength may be subject to a surcharge.

4. Westminster shall pay Fitchburg a sewer user fee, charged on a quarterly basis, of $2.50 per 100 cubic feet (approximately 748 gal.) of Normal Strength wastewater discharged to the Route 31 metering station and $0.85 per hundred cubic feet of Normal Strength wastewater discharged to the Route 2A metering station.

5. Westminster is responsible to maintain the metering devices at the two respective connection points to the Fitchburg wastewater collection system. Fitchburg must also approve of any changes to the metering stations.

6. No septage can be discharged in the Westminster wastewater collection system.

7. The agreement establishes a termination date of twenty-five years. An extension may be negotiated one year prior to termination.

2.4.1.2 IMA Requirements

As well as specifying the quality and quantity of wastewater discharged to Fitchburg for treatment and disposal, the IMA requires Westminster to follow specific regulations, requires Westminster to enact ordinances, provides approval procedures, and specifies other actions that must be undertaken by Westminster. Although these requirements do not specifically limit Westminster's use or discharge to Fitchburg, they must be followed or the agreement may be terminated.

2.4.1.3 IMA Limitations

In general, the IMA provides a sound and appropriate means of limiting and controlling the discharge of wastewater from Westminster to Fitchburg. However, the current agreement presents several issues to be considered in future IMA negotiations:

- The IMA indicates that the Town of Westminster could exceed the discharge limits without penalty (at the most recently adopted rate structure of $2.50 per 100 cubic feet for volumes greater than the combined 320,000 gpd limit currently established) until an I/I study of the Fitchburg system is completed. The IMA indicates that the Town could increase allowable flows to Fitchburg at a rate of 1:1 for each gallon of I/I removed from the Fitchburg system via repairs or rehabilitation recommended by the I/I study and funded by the Town of Westminster. It also offers that the Town could increase capacity if it finances improvements to the West Fitchburg Wastewater Treatment Plant. The I/I study was expected to be complete by June 30, 2000 and is still in progress according to Fitchburg DPW officials.

- There is no limitation on peak daily flow. Therefore, there are no assurances of the peak capacity of the pipes utilized by Westminster in Fitchburg. IMAs commonly include language specifying the particular pipes and the allotted capacity to address issues regarding sewer system overflows and backups. If surcharging were to occur related to capacity limitations in Fitchburg, the current force main configuration that discharges Westminster's wastewater may cause sanitary sewer overflows or backups that could impact users in Fitchburg. Similar effects may be experienced in Westminster if the sewer is reconfigured with gravity pipes.

- The average daily flow limitations only express a minimum time period of 28 days to generate average daily flows. However, this could be interpreted that a much longer average period could be used including periods of time that Westminster's flows were substantially less than the IMA capacity, therefore allowing for a long period of time above the stated capacity limits.

2.4.1.4 Contractual Capacity Remaining

The flow values expressed in the IMA are average daily flows based upon a minimum measuring period of 28 days; therefore, the largest 28-day flow through the Route 2A metering station should be obtained from existing records to compare with the IMA discharge limit of 250,000 gpd. The meter along Route 2A is typically read weekly, and the average daily flow can be determined from the total flow measured. The largest average daily flow measured over a 28-day period at the meter was approximately 170,300 gpd in March 2003, based on 2002/2003 flow data provided by the Town.

2.4.1.5 Availability of Additional Capacity

S E A Consultants contacted the City of Fitchburg DPW on September 14, 2005 to verify if additional capacity could be purchased for the treatment and disposal of additional wastewater from Westminster. Fitchburg officials responded that additional capacity is limited. The City is currently awaiting the completion of several studies, including the comprehensive I/I study, and construction projects prior to making a decision on whether to increase the capacity of its treatment plants, and subsequently the ability to increase the Westminster IMA capacity.

Currently Fitchburg is undergoing substantial changes in the configuration of its wastewater treatment system and in the wastewater it treats. Fitchburg treats the wastewater generated from its users at two separate wastewater treatment facilities. The City recently constructed facilities that allow the wastewater discharging to the West Plant to be redirected to the East Plant. This allows domestic wastewater and industrial wastewater to be treated and discharged at the East Plant, which limits additional capacity at the East Plant. The West Plant now receives flow from paper mills only.

Fitchburg is also beginning a combined sewer overflow (CSO) reduction program, through a sewer separation program. Currently several CSOs are active in Fitchburg during precipitation events and one in particular is affected by flows from Westminster.

Lastly, Fitchburg serves other municipalities as a centralized treatment and disposal utility. The Town of Leominster has recently requested a review of their capacity arrangement with Fitchburg and will have consideration when Fitchburg is better able to make decisions regarding the treatment and disposal of wastewater. At the time of the conversation, it was assumed that Fitchburg will not be able to consider an increase to the Westminster IMA capacity until 2007-2008, based on the schedule of their wastewater system improvement projects.

2.4.2 Sewer Use Rules and Regulations

The Westminster Sewer Department charges sewer customers 115% of metered water usage, as of January 2005. The current water rates were enacted approximately 10-years ago and are the same for all user classes. They are based on a rate of $75 per 20,000 gallons of water use, which equates to $3.75 per 1000 gallons ($2.81 per 100 cubic feet). If 20,000 gallons of water use is exceeded in the billing period, additional usage is charged at $5 per 1000 gallons ($3.74 per 100 cubic feet). Users are billed quarterly, semi-annually, or annually based on the class and type of user. The 115% mark-up for sewer use translates to a sewer rate of $4.31 per 1000 gallons ($3.22 per 100 cubic feet) within the first 20,000 gallons of semi-annual water use. Properties connected to Town sewer that have private water supply wells typically have a water meter to allow for sewer billing.

The Sewer Department maintains sewer use regulations that govern installation, connection, and discharge. The Town regulations require a permit application process for connecting into the sewer system. The regulations also provide a representative of the Sewer Department the opportunity to review the permit application and any applicable plans and details, as well as inspect the construction of the sewer connection/extension for conformance with the regulations. The department charges a permit and inspection fee of $75 for new residential, commercial, or industrial sewer connections.

The Subdivision of Land Regulations maintained by the Westminster Planning Department address connections to the Town sewer system for new development in the section regarding utilities installations. The regulations identify that connections to existing sewers shall be made if there is adequate capacity to serve the subdivision. If there is inadequate capacity to serve the entire subdivision, only a portion that can be accommodated shall be allowed to connect.

The regulations also require that the sewer extension be continued to the extents of the development with adequate size and slope to serve existing undeveloped areas adjacent to the subdivision, where applicable.

The regulations require that a full design of the proposed connection or extension be submitted for review. The design shall include hydraulic calculations and flow estimates, and shall be based on a standard flow velocity range of two feet per second to ten feet per second.

2.5 Sewer System Limitations

Components of the Whitman River collection system that limit capacity have been previously evaluated in past studies and upgraded as necessary to increase capacity and allow expansion of the collection system. As detailed, the Whitman River collection system serves virtually all sewer users in Town and has been further expanded within the last few years. These expansions have limited reserve capacity, yet future extensions to new developments are expected. An improvement plan must be developed that targets the limiting components of the system to allow expansion where necessary without encouraging

excessive growth and further reduction of the system's reserve capacity. This section summarizes known limitations to assist in developing such a plan.

2.5.1 Summary of Previous Reports

The *Draft Wastewater Pumping Station 3 Evaluation Report*, prepared by Earth Tech in September 1996, evaluated the Whitman River Pump Station, the Fitchburg interceptor, and the intermunicipal agreement with Fitchburg. It also summarized existing and proposed wastewater flows. The report recommended that if the Town planned to allow additional connections to the existing sewer system, then the pump station should be upgraded. The recommended pump station upgrade was completed in 2000, as detailed in a previous section of this chapter.

The Village at Old Mill, Review of BSC Group's Wastewater Flow Evaluation, prepared by Earth Tech in 2002 reviewed a proposed connection to the Westminster municipal sewer system. The Earth Tech review determined that flow from the now recently constructed sewer projects and future flow from this proposed development will cause peak flows to approach or possibly exceed the pump station capacity of 500 gpm. The review concludes that "with the additional flow from the proposed development…there is a possibility that on some occasions, both pumps will have to run to handle the flow". More importantly, the review indicates that both pumps have run during past wet weather events, and increased I/I could potentially further reduce the available capacity at the pump station.

The Town requested that S E A perform an updated Capacity Analysis of the wastewater system to assess the situation described in the latest review conducted by Earth Tech and determine "whether or not there are immediate or future limiting factors associated with the Town's ability to collect, convey, and treat wastewater from existing and future development within the sewered areas of the community." The analysis was completed in August 2004 and is attached as Appendix A to this report. The following table summarizes the conclusions of the Capacity Analysis:

Table 2.6
Existing and Future Wastewater Flow

Peak Hourly Wastewater Flow with I/I (Existing)	654,000 gpd
Peak Hourly Wastewater Flow with I/I (Future)	592,589 gpd
Total Peak Hourly Wastewater Flow	**1,246,589 gpd**
Flow Converted to Gallons per Minute	**866 gpm**
Pump Station Capacity	**500 gpm**

The conclusions of the analysis are as follows:

- The average daily flow under current conditions is approximately 120,000 gpd; inflow and infiltration contribute approximately 30,000 gpd of additional flow;
- Peak hourly flows are approximately 654,000 gpd;
- Unconnected properties situated within sewered areas have the potential to contribute an additional 46,200 gpd;
- Simplex Time Recorder Co. has the potential to contribute an additional 50,000 gpd;
- Proposed sewer extensions to new developments (including additional I/I) could contribute an additional 18,900 gpd, based on developers' estimates;
- Peak hourly flows from future development are estimated to be approximately 592,589 gpd;
- Total peak hourly flows are estimated to be 1,246,589 gpd, which is equivalent to 866 gpm;
- Whitman River Pump Station capacity is approximately 500 gpm;

- The Intermunicipal Agreement with Fitchburg, as amended, allows a minimum of 250,000 gpd through the Whitman River Pump Station, and the potential exists for much more.

The analysis concluded that within the sewer system, the pumping capacity of the Whitman River Pump Station is the limiting factor. The estimates of wastewater flow suggested that "if all current residents with the right to connect to the sewer system were to do so, and pending sewer extensions are completed, the peak wastewater flow would exceed the Whitman River Pump Station capacity."

The analysis recommended that the Town continue to implement the existing Sewer Moratorium until the CWMP has evaluated alternatives for wastewater management. It also recommended that the Town carefully monitor new sewer connections and that approximately 67 additional residential connections (representing 12,730 total gallons per day) can be connected to the system within the remaining pump station capacity.

2.5.2 Feasibility of Siphon

An evaluation report prepared by Whitman & Howard in 1989 investigated the possibility of replacing the Whitman River Pump Station with two 6-inch diameter sewer-siphons under the Whitman River versus upgrading the pump station and force main. The report recommended an upgrade of the pump station and force main based on a cost analysis of the two options.

To verify the feasibility of a potential siphon under the Whitman River, S E A performed a desktop evaluation of a siphon to replace the existing Whitman River Pump Station and force main that connects to the Fitchburg interceptor at Monty Tech. The evaluation was based upon available record drawings of the original sewer construction project associated with the Wachusett Mountain sewer extension. The records indicate that there is an elevation difference of approximately 5.7 feet from the pump station wet well inlet to the force main discharge point. The distance from the wet well to the discharge point is approximately 2,880 feet.

On a preliminary design basis, the elevation change is adequate to allow the installation of a gravity sewer/siphon system. However, there are several concerns associated with the design of a replacement sewer and include the following:

- A second pump station discharges into the force main. The second pump station serves a private condominium development located along West Hill Drive (north side of the Whitman River) and discharges to the force main at that location. Information regarding the installation of this pump station and force main has not been located, and this connection may require modification to or preclude the gravity sewer option.

- The elevation change and required slope is not available to adequately convey sewage through a gravity sewer/siphon based on standard design criteria. The system would have to be sized and sloped such that the pipe would be larger than required to meet the actual hydraulic needs of Westminster. Additionally, the standard elevation drop through manholes in the gravity portion of the system could not be implemented, leaving the sewer flows sluggish and prone to settlement.

- The record drawings of the force main depict several other utilities crossing the Route 2A right of way. It appears that these utilities would be in conflict with a gravity sewer and would require relocation in order to allow installation. Several of the utilities are large storm drains, which would involve substantial capital expenditure to replace or relocate.

- Based on the record drawings, the gravity sewer would be placed at a very shallow depth including approximately 1,000 feet of gravity sewer with less than two feet of cover. This would require protection of the pipe in the roadway from bearing loads and protection from freezing.

Based on the results of the evaluation, a replacement gravity sewer/siphon system has several limitations; therefore, it is not a recommended option.

2.5.3 Areas in Need of Odor Control Measures

The Town of Westminster has experienced historical odor complaints emanating from a sewer manhole located at the intersection of East Road and Laurel Drive. The Town has noted indications of corrosion in the manhole related to sewer discharges. Odor and corrosion in wastewater collection systems is generated through the decomposition of wastewater under anaerobic conditions. The amount of odor and corrosion increases with higher wastewater temperatures and the length of time the wastewater is subject to anaerobic conditions. The most likely location for sulfide generation in a collection system is in sewer force mains and pump station wet wells. Conditions in the wet wells and force mains prevent the addition of oxygen from outside sources and generate sulfide.

The odor and corrosion occurring at the East Road manhole is related to the configuration of the sewer system that serves this area of Town. This includes East Road, Gate House Road, Val Road, Wachusett Drive, Lakefield Drive, Kent Road, and Wachusett Mountain. The system utilizes two separate force mains to convey wastewater from this area to gravity sewer that discharges to the Narrows Road Pump Station. One force main is connected to three wastewater pump stations and the other is connected to approximately 30 residents through a low pressure sewer system. Both force mains are creating conditions that promote sulfide odor and corrosion. There are other factors within the system that exacerbate the odor and corrosion. The largest sewer user in the area, Wachusett Ski Area, is generally idle in the summer when the wastewater reaches its highest temperatures and the discharges from their pump station are minimal on a daily basis. These conditions contribute to increased sulfide generation in the summer.

Westminster should avoid allowing additional force main connections in this area of the sewer system. Additional sulfide contribution from a new pump station will exacerbate the deterioration of the existing sewer system and increase odor complaints.

2.6 On-Site Wastewater Management Systems

The Massachusetts Department of Public Health promulgated rules and regulations for the control of individual sewage disposal systems in 1962, which were known as Article XI of the State Sanitary Code. The authority was subsequently transferred from the Department of Public Health to a newly created Department of Environmental Protection (formerly called the Department of Environmental Quality Engineering) by the Legislature. The Department of Environmental Protection, with authority to develop a State Environmental Code, created *Title 5 - Minimum Requirements for the Subsurface Disposal of Sanitary Sewage* in 1977. Title 5 of the State Environmental Code replaced Article XI of the State Sanitary Code and became the official regulation for the statewide control of on-site systems. Title 5 was revised several times between 1977 and the current version, dated December 27, 1996 (310 CMR 15.000).

Title 5 serves to provide comprehensive standards with the goal of protecting public health and the environment in all communities of the Commonwealth where the use of on-site systems is required. Title 5 prescribes the manner in which subsurface sewage disposal systems should be located, designed, constructed, and inspected based on accepted standards and methods for the design, construction,

maintenance, and repair of on-site systems under a wide range of conditions common to the Commonwealth.

2.6.1 Description of On-Site Disposal Systems

There are approximately 2,070 residences within the Town of Westminster that utilize on-site disposal systems, as of January 2005. This comprises just over 80-percent of the residences in Town. There are on-site disposal systems within Town that serve commercial establishments as well. Industrial establishments within Town are connected to the sewer system. Most of these subsurface disposal systems consist of conventional septic systems. A conventional septic system consists of four main components that receive the wastewater from the building. The first is the septic tank, which allows the heavier solids and the lighter scum to be separated from the effluent. The second is the distribution chamber, which serves to direct flow evenly to the leaching field. The third is the leaching field, which may consist of a single bed, or two or more trenches, and serves to distribute septic tank effluent to the surrounding soil. The fourth and often forgotten component is the soil between the leaching field and the groundwater. It is actually this soil that provides the majority of the treatment for a conventional on-site system. Title 5 septic systems may also include a reserve leaching area for use if the primary leaching area fails. Figure 2-3 provides a simple schematic of a typical on-site septic system.

Figure 2-3
Typical Septic System Diagram

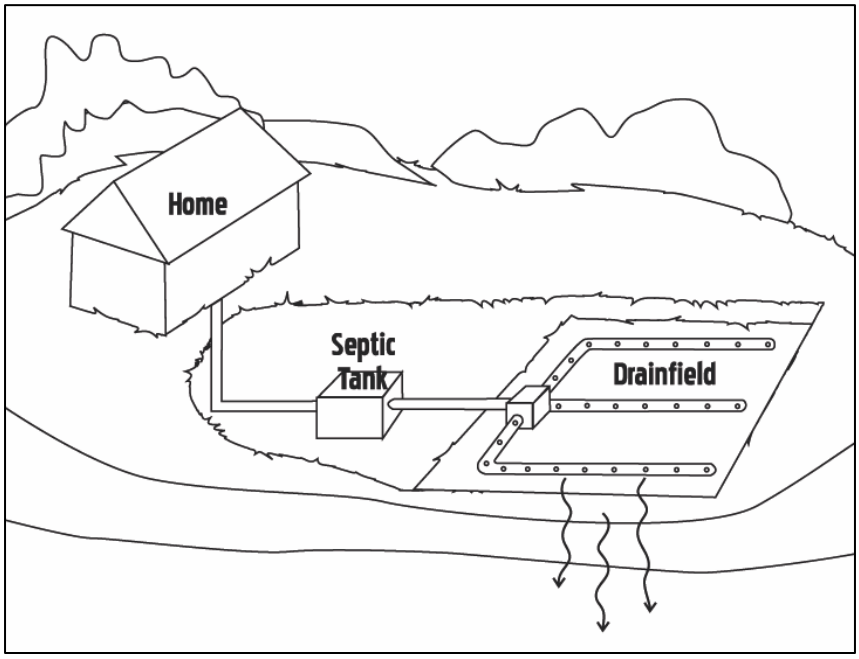


Diagram obtained from The Groundwater Foundation.

There are systems within Town that were constructed prior to the State's first environmental code in the early 1960's. In addition to conventional septic systems, there are cesspools functioning in Town. A cesspool consists of a leaching pit that receives wastewater from the building and acts as both a settling chamber for solids and a leaching system for liquids. The pit allows the wastewater to leach into the surrounding soil. This type of system may not allow proper detention of solids or proper distribution of wastewater. "As a result, the wastewater can overload the capacity of the soil to remove bacteria and viruses, to remove phosphorous, and to nitrify ammonia and organic nitrogen compounds" (MA-DEP, 2004).

According to the Board of Health, there are many tight tanks located within Town, with most located throughout the Wyman Pond area. Tight tanks are sealed holding tanks that do not discharge wastewater, and must be pumped regularly. "Title 5 strongly discourages the use of tight tanks, but they are allowed in situations where an existing system has failed and there is no other feasible alternative. Tight tanks are not allowed for new construction or increases in design flow" (MA-DEP, 2004).

Areas in Town that experience problems with the construction and operation of Title 5 systems were identified through discussions with the Board of Health and other Town officials. Some of the typical problems encountered in these areas are frequent need for variances from Title 5 to install systems, the need to install tight tanks, or costly systems resulting from extensive site limitations. The neighborhoods surrounding Wyman Pond that rely on septic systems were identified as the most problematic area in Town. The homes located on Partridge Pond were also identified as experiencing difficulties with on-site systems. Lastly, the existing development along Route 2A, west of Tophet Swamp is problematic due to high groundwater in the area.

There are not any wastewater treatment plants located in Town; however, there are several, large commercial establishments using on-site wastewater disposal systems in Westminster. The capacities of the systems are estimated based on 2002/2003 Westminster water use records and the methodology used in the Capacity Analysis for estimating wastewater flow. The following listing, in Table 2.7, identifies the largest four on-site disposal systems in Town.

Table 2.7
Large On-Site Disposal Systems

Location		Name	Capacity (gpd)
9	Village Inn Road	The Village Inn	8,990
21	Village Inn Road	Peterborough Oil Co.	5,100
2	Narrows Road	Westminster LLC	3,530
94-98	Sargent Road	Westminster Ridge Apartments	3,140

This table provides estimated system capacity over a year. The actual design capacity or peak capacity of the system may vary. The Board of Health (BOH) did not identify any properties with MA-DEP Groundwater Discharge Permits for on-site systems with design capacities in excess of 10,000 gpd.

The BOH provided available information regarding on-site disposal systems in Town. The BOH indicated that there are three systems employing Innovative/Alternative (I/A) technologies located in Town. The system located at 142 Overlook Road uses JET® aerobic technology to allow a 2-foot reduction in the required groundwater offset. The system located at 31 Harrington Road uses FAST® technology to gain approval for general use within the regulated surface water supply watershed. The system located at 300 Minot Road also uses FAST® technology to reduce the required leaching area by 50-percent. BOH requirements are explained in the following section of the chapter. A brief overview of various I/A technologies and sources of additional information are provided in the Wastewater Alternatives Analysis chapter of this report. Each of the owners of these systems conducts quarterly inspections in accordance with DEP requirements.

2.6.2 Westminster Board of Health Septic System Regulations and Procedures

2.6.2.1 Septic System Regulations

The Westminster Board of Health Regulations governs the use of sewage disposal systems in Town. The Board of Health regulations adopt Article XI of the State Environmental Code (which has been replaced by Title 5 - 310 CMR 15.00) as the local regulation, with superseding additions.

Notable superseding additions in the regulations that affect the design of new septic systems in Town include a minimum leach bed area of 1,000 square feet, a minimum setback for proposed leaching facilities of 100-feet from any watercourse (as defined by the Wetlands Protection Act), and a minimum setback for proposed leaching facilities of 300-feet from a surface water supply source for drinking water or its tributary surface water. The regulations also require that the bottom of proposed leaching facilities be 8-feet above the high groundwater elevation within the watershed of a surface water supply source for drinking water, and fill is not allowed to be used to gain the 8-foot offset. For areas of Town outside of a surface water supply watershed, the bottom of proposed leaching facilities must be 6-feet above the high groundwater elevation. The regulations indicate that variances for the use of retaining walls to meet the slope requirements of Title 5 will not be granted for new construction. They are allowed for repairs to existing systems.

A significant component of the regulations is the BOH requirement that a septic system must be located on the same lot as the building that it serves. This regulation prevents the use of nearby lots and/or easements to construct a "satellite" system to serve a building or several buildings on separate parcels of land.

Where full compliance to Title 5 is not feasible, the approving authority is allowed to issue local upgrade approvals for existing systems. The local approving authority in Westminster is the BOH. The purpose of the upgrade approval is to "allow for both the best feasible upgrade within the borders of the lot, and have the least effect on public health, safety and the environment" by "varying to the least degree necessary" from the regulations. Title 5 outlines several basic requirements that may not be varied by the local approving authority. If one or more of these requirements cannot be met in an upgrade, the owner shall apply to the MA-DEP for either a groundwater discharge permit, the use of a tight tank, a variance, or to abandon the system. The owner may also construct an approved innovative/alternative technology system in order to meet the requirements.

2.6.2.2 Board of Health Procedures

The Westminster BOH maintains wastewater disposal records for all addresses with submitted or recorded information within Town. The records consist of paper files located at the BOH office. They are organized by street and house number. Older BOH files (prior to the late 1970s) and certainly those dated prior to the start of regulations in 1962 have limited information and may not include plans. The files also contain disposal system pump-out records, which regulations require to be submitted by the septage haulers after each pump-out. If the on-site system is subsequently abandoned, the Sewer Department performs an inspection and submits a report to the BOH, which is placed on file at the office.

The Town does not maintain an on-going, mandatory subsurface disposal system maintenance or inspection program. Title 5 requires inspection of residential septic systems "at or within two years prior to the time of transfer of title of the facility served by the system," and if there is a change in facility use, or modification to the design flow. Shared systems and systems serving multifamily developments are required to be inspected annually. Title 5 inspection requirements have been in place since 1995. Because of this requirement, every system in Town will eventually be subject to inspection.

According to Title 5, systems that require pumping more than four times per year are considered failing. As the BOH receives pump-out tickets from septage haulers, they place them into the appropriate files as previously discussed. At this time, pump-out tickets are reviewed to confirm if that particular system is a tight tank. If it is a conventional on-site system and is exceeding four pump-outs per year, the owner of the system would receive notification from the BOH stating that their system has failed and it must be upgraded according to the regulations.

The BOH records include septic system permit applications dating back to the 1970s. The records include address, date issued, and type of permit. More detailed permits may include site information such as soil types and groundwater depth encountered. The permit application types include: new construction, fully compliant repairs or upgrades, maximum feasible repairs or upgrades, and emergency repairs. An emergency repair is defined in Title 5 as "the repair of a system which is necessary to prevent sewage backup into a building, surface breakout of sewage, or to alleviate an imminent danger to public health, safety or the environment in accordance with 310 CMR 15.353." This includes a repair or replacement of a structural component of a system that is otherwise in compliance with Title 5. As previously discussed, fully compliant systems have been repaired and upgraded in full compliance with Title 5, but maximum feasible repairs or upgrades have not.

The BOH noted that residents have utilized low-interest loans offered by the state for new construction and upgrades of on-site systems. The Town does not maintain or administer municipal grant or loan programs independent of the state.

3. Existing Water Supply

3.1 Introduction

The Town of Westminster obtains its public drinking water supply from surface water sources. Historically, the Town withdrew water from Meetinghouse Pond and provided limited chlorination and fluoridation treatment, with access for sampling at the South Street Pump Station. Currently, the Westminster water supply is purchased through an intermunicipal agreement (IMA) with the City of Fitchburg, which owns and operates the Regional Water Filtration Facility located in Westminster. The regional treatment plant was constructed in 1999, and withdraws water from Meetinghouse Pond.

3.2 Public Water Supplies

3.2.1 Interconnection with Fitchburg

Westminster currently obtains water supply through an IMA, dated May 26, 1999, between the City of Fitchburg and the Town of Westminster, which is discussed further within this chapter. The agreement was completed to allow for the construction of the Regional Water Filtration Facility within the boundaries of Westminster. The plant was built on the Hager Park site, along Hager Park Road. The treated water is for distribution throughout both communities.

Finished water supply to Westminster is delivered through a 12-inch water main to the Westminster Hager Park Pump Station located adjacent to the Treatment Facility. This pump station provides all supply to the Westminster water system. The water system serves approximately 39-percent of all residences in Town and is operated and maintained by the Town Water Department. The balance of the residents in Westminster are served by private wells for water supply. Only a portion of the private wells which serve homes connected to the municipal sewer system are metered. Consequently, information pertaining to these sources is limited. Assumptions regarding private water use, based on available information, are summarized in the last section of this chapter.

Water supply for the Regional Water Filtration Facility is derived solely from surface water reservoirs. The City owns and maintains 10 reservoirs, three of which are currently utilized as sources for the facility, including Meetinghouse Pond, Mare Meadow Reservoir, and Bickford Pond. Bickford Pond is located just south of Mare Meadow Reservoir, in Hubbardston. Both of these sources are used to supplement Meetinghouse Pond. The City is also permitted to withdraw water from Wachusett Lake, which is located mainly in Westminster; however, it does not provide supply to the treatment plant. Water from this source is provided directly to Wachusett Mountain. Fitchburg is considering the potential of connecting Wachusett Lake to the treatment plant in the future. Surface water supplies located within Westminster are summarized in Table 3.1 of the report. The facility is designed to process 12.0 million gallons per day (mgd) of water supply and has the potential for expansion up to 15.0 mgd if future demand requires. The treatment process utilizes chemical additions for pH/alkalinity adjustments, oxidation, disinfection, coagulation, and fluoridation. The City of Fitchburg has recently completed construction of a second treatment facility near the Falulah/Lovell Reservoirs, which has the capacity to treat 6.0 mgd. Operation and maintenance of the plant is conducted by the City of Fitchburg and costs are assessed to the Town of Westminster. The charges for operation and maintenance are proportional to the volume of water consumed by Westminster and the total volume of water produced at the facility.

Table 3.1
Surface Water Supply Sources

Description	Type	Safe Yield
Meetinghouse Pond	Surface Water – Public	1.03 mgd
Mare Meadow Reservoir	Surface Water – Public	2.50 mgd
Wachusett Lake	Surface Water – Public	

1. Summary of sources located within the Town of Westminster only.

The locations of these water supply sources are displayed in Figure 1-2 of this CWMP (attached at the end of this report).

3.2.2 Water Supply Wells

There are many non-community public water supplies within Westminster, all of which consist of groundwater wells. A summary of these water supply sources are listed in Table 3.2 below.

Table 3.2
Groundwater Supply Sources

Description	Type
DEM - Leominster State Forest Well	Transient Non-Community
Shore Bible Camp Well	Transient Non-Community
The Woods at Westminster – Well #1	Transient Non-Community
The Woods at Westminster – Well #2	Transient Non-Community
Wachusett Mountain Ski Area – Well #1	Non-Transient Non-Community
Wachusett Mountain Ski Area – Well #2	Non-Transient Non-Community
Rancor Incorporated – Well #1	Non-Transient Non-Community
Rancor Incorporated – Well #2	Non-Transient Non-Community
Rancor Incorporated – Well #3	Non-Transient Non-Community

1. *Transient Non-Community* is defined by DEP as a "public water supply system which serves water to 25 different persons at least 60 days of the year."
2. *Non-transient Non-community* is defined by DEP as a "public water system that is not a community water system and that regularly serves at least 25 of the same persons or more approximately four of more days per week, more than six months or 180 days per year."

3.2.3 Emergency Water Supply

A Department of Environmental Protection (MA-DEP) Water Withdrawal Permit under the authority of the Water Management Act (WMA) was issued for Westminster to obtain water supply withdrawals directly from Meetinghouse Pond. The original registered withdrawal amount is for 0.24 mgd of water on an annual average basis. The permit became effective on November 23, 1994 and was last modified on March 18, 2003. Through the modified permit, increases to this registered withdrawal volume are reviewed every five years up to the year 2014. Table 3.3 summarizes the permitted increases to the original registered amount of 0.24 mgd on an average daily basis and on a total annual basis as million gallons per year (mgy).

Table 3.3
Additional Permitted Withdrawal Volume

Time Period	Average Daily Withdrawal (mgd)	Total Annual Withdrawal (mgy)
November 23, 1994 – February 28, 1999	0.22	80.30
March 1, 1999 – February 28, 2004	0.25	91.25
March 1, 2004 – February 28, 2009	0.28	102.20
March 1, 2009 - February 28, 2014	0.32	116.80

Currently, the Town is permitted with DEP to withdraw up to 0.52 mgd or approximately 190 mgy total. Though the Town purchases water from Fitchburg, it maintains this permit in case of a water supply emergency. In an emergency, the Town would utilize the South Street Pump Station, which supplied water to the Town in the past. However, the pond is an active source for the Fitchburg Regional Water Filtration Facility, through which the Town obtains permanent water supply. The Draft Master Plan indicates that the Town has an agreement with Fitchburg that allows withdrawals up to 100 mgy from Meetinghouse Pond without payment to Fitchburg. It also mentions that the Town has exceeded this amount in the past, but the fees are reasonable.

A *Safe Yield Analysis for the Water Supply Reservoirs – Fitchburg, Massachusetts* was completed in October 1991 by S E A Consultants Inc. The water withdrawal permit acknowledges this report which indicates the safe yield for Meetinghouse Pond is 1.03 mgd, and indicates total daily withdrawals over this volume cannot be obtained without approval from DEP. The safe yield of Mare Meadow Reservoir is 2.5 mgd, and is used by Fitchburg to supplement Meetinghouse Pond.

3.2.4 Potential Water Supply

The Town identified a potential groundwater well supply near Wyman Pond referred to as Site 20 in 1971. A prolonged pump test was performed in 1971 and a subsequent pump test was performed in 1986 to test the groundwater for volatile organic compounds (VOCs). The report on the 1986 test, prepared by Whitman & Howard, determined that the groundwater is excellent quality and that the maximum pumping capacity of a gravel packed well at the site would be approximately 560 gpm.

The March 1996 *Water System Analysis* prepared for Westminster by Earth Tech indicated that further exploration in the Site 20 area in 1994 showed a more promising test well in the vicinity of Honey Bee Lane. A prolonged pump test was not performed at this other site, but it was estimated that a gravel-packed well at this site could have a long-term yield between 500 and 1,000 gpm. The analysis mentions that the Town has already obtained easements to install a water transmission main from this area to Patricia Road. The Town would also need to install a water main to Route 140 to connect to the water system at Gatehouse Road or at Hager Park Road. The Town already owns much of the Zone I wellhead protection area, which consists of a 400-foot radius around the well site. An approximate Zone II protection area was delineated during the prolonged pump test in 1986.

This potential well site is located in the "Middle Zone" of the three pressure zones that exist in the Town water system, as described in the following section of this report. If the Town were to install a gravel packed well at this site, a pump with a high pumping head and a long transmission main would be required to pump to the Town's water storage tanks located in the "High Zone." This option would be costly and potentially problematic for the Town. A more desirable option would be to install a water storage tank in the "Middle Zone" near the well site. The well could then serve this pressure zone and the "Low Zone," which is supplied through the "Middle Zone." The Town has previously purchased land along Route 140 for a potential water tank site.

Based on the estimated pumping capacity reported during the 1986 pump test, and an assumed operation schedule of 16-hours of pumping per day, this site could supply up to approximately 0.54 mgd of water daily to the Town water system. The results of the additional well investigations by Earth Tech in 1994 estimate that even more supply can be obtained from a deeper well at the site. This is a significant supply considering the Town purchased approximately 0.36 mgd of water from Fitchburg on an average daily basis in 2005.

3.3 Water Distribution System

Based on previous water system analyses, a substantial portion of the Westminster water distribution system was constructed in 1955, with additional improvements in the 1960s and 1970s, and minor additions since that time. There are approximately 1,100 customers as of January 2005. Two of the customers consist of small water districts located in Town that purchase water from the Town and distribute it to residential customers. A majority of the users, approximately 93-percent, are residential. The remaining connections are approximately 6-percent industrial or commercial users and 1-percent municipal or other users.

3.3.1 Water Mains

The Westminster water distribution system consists of approximately 35.5 miles of water mains ranging from 6-inch to 16-inch in diameter, excluding small piping and customer services. The current extent of the water system is displayed in Figure 3-1 of this CWMP, attached at the end of this report (prior to appendices). Table 3.4 provides a summary of the water distribution piping and length.

Table 3.4
Water Main Summary

Water Main Size (inches)	Total Length (miles)	Percent of Total
6	2.69	7.6%
8	22.16	62.9%
10	5.32	15.1%
12	3.83	10.9%
16	1.25	3.5%
Total	**35.25**	

As indicated in Table 3.4, a majority of the system consists of 8-inch piping. Based on the *Water System Analysis*, the distribution system consists of asbestos cement and ductile iron water mains. The Draft Master Plan indicates that approximately 20 miles of the existing water mains are asbestos cement pipe. These pipes are older and the material is not as durable as ductile iron, which may necessitate water main replacement in the near future.

The *Water System Analysis* evaluates the static pressure in the distribution system and identifies three pressure zones within the distribution system. Pressure in these zones is regulated through the use of pressure regulating valves.

- The “High Zone” consists of areas with the highest elevations in the water system and static pressure is generally between 28 and 105 pounds per square inch (psi). This pressure zone consists of about 20.5 miles of the existing water distribution system, and contains both storage tanks in the system.

- The "Middle Zone" is supplied through the "High Zone" through the use of two pressure regulating valves, one located on Main Street near the intersection of Elliot Street and the second at the intersection of Marshall Hill Road and Leominster Street. Both valves are adjusted to discharge at a pressure of 65 psi; however, the static pressure within the "Middle Zone" system is generally between 68 and 113 psi. This zone is located to the east of Town Center.

- The "Low Zone" is supplied from the "Middle Zone" through the use of two pressure regulating valves, one located along Route 2A near Battles Road and the second located along Turnpike Road near Depot Road. Again, both valves are adjusted to discharge at a pressure of 65 psi; however, the static pressure within the "Low Zone" is generally between 80 and 137 psi.

3.3.2 Water Distribution Storage

The March 1996 analysis identifies two water storage facilities within the system. The capacities of these storage tanks are summarized in Table 3.5 and their locations are identified in Figure 3-1 of this report.

Table 3.5
Water Storage Facilities

Tank Name	Type	Year	Storage Capacity (million gallons)
Ellis Road Tank	Steel Standpipe	1955	0.37
Shady Avenue Water Tank	Prestressed Concrete Tank	1970	1.00
		Total	**1.37**

Both storage tanks have an overflow elevation of 1245.0 feet, National Geodetic Vertical Datum (NGVD).

The analysis provided an evaluation of the existing storage capacity in Town utilizing water demand projections through the year 2015. The analysis evaluated equalization storage, fire storage, and emergency storage and concluded that it is sufficient to meet the existing conditions and future needs of the Town.

3.3.3 Pump Stations

3.3.3.1 Hager Park Pump Station

The Hager Park Pump Station currently supplies the Town distribution system with treated water from the Regional Water Filtration Facility and is located adjacent to the facility on Hager Park Road (Figure 3-1). The pump station supplies all water to the Town system. It was installed in 2001 and consists of two regular pumps and one emergency pump with motors. The station is equipped with emergency power. It has a 6-inch suction pipe and a 5-inch discharge main. The pump station capacity is 700 gpm. This equates to a maximum flow (24-hours of pumping) of 1.0 mgd on a daily basis.

3.3.3.2 South Street Pump Station

As discussed previously, the South Street Pump Station was used in the past to supply water to the Town distribution system (Figure 3-1). The pump station is currently inactive and maintained in case of an emergency. It was installed in 1962 and consists of two regular pumps and one emergency pump with motors. The station is equipped with emergency power. It has a 6-inch suction pipe and a 4-inch discharge main. The pump station capacity is 600 gpm. This equates to a maximum flow (24-hours of pumping) of 0.86 mgd on a daily basis.

3.4 Water Consumption

Westminster's total average daily water consumption through the municipal water system has remained fairly consistent at just over 0.34 million gallons per day over the period of record (2000-2005). Use by category, however, has varied considerably. The following sections detail historical water consumption by category.

3.4.1 Historical Water Consumption

Table 3.6 provides a summary of past annual public water consumption for Westminster from 2000 through 2005 based on data provided in the MA-DEP Public Water Supply Annual Statistical Reports.

Table 3.6
Historical Water Consumption

Year	Total Volume Purchased (Gallons)	Total Volume Sold (Gallons)	Total Volume Consumed (Gallons)
2000	79,235,700	4,266,090	74,969,610
2001	120,602,900	4,763,630	115,839,270
2002	137,339,800	4,300,790	133,039,010
2003	155,919,300	4,454,490	151,464,810
2004	129,025,300	4,035,000	124,990,300
2005	131,839,200	4,631,830	127,207,370

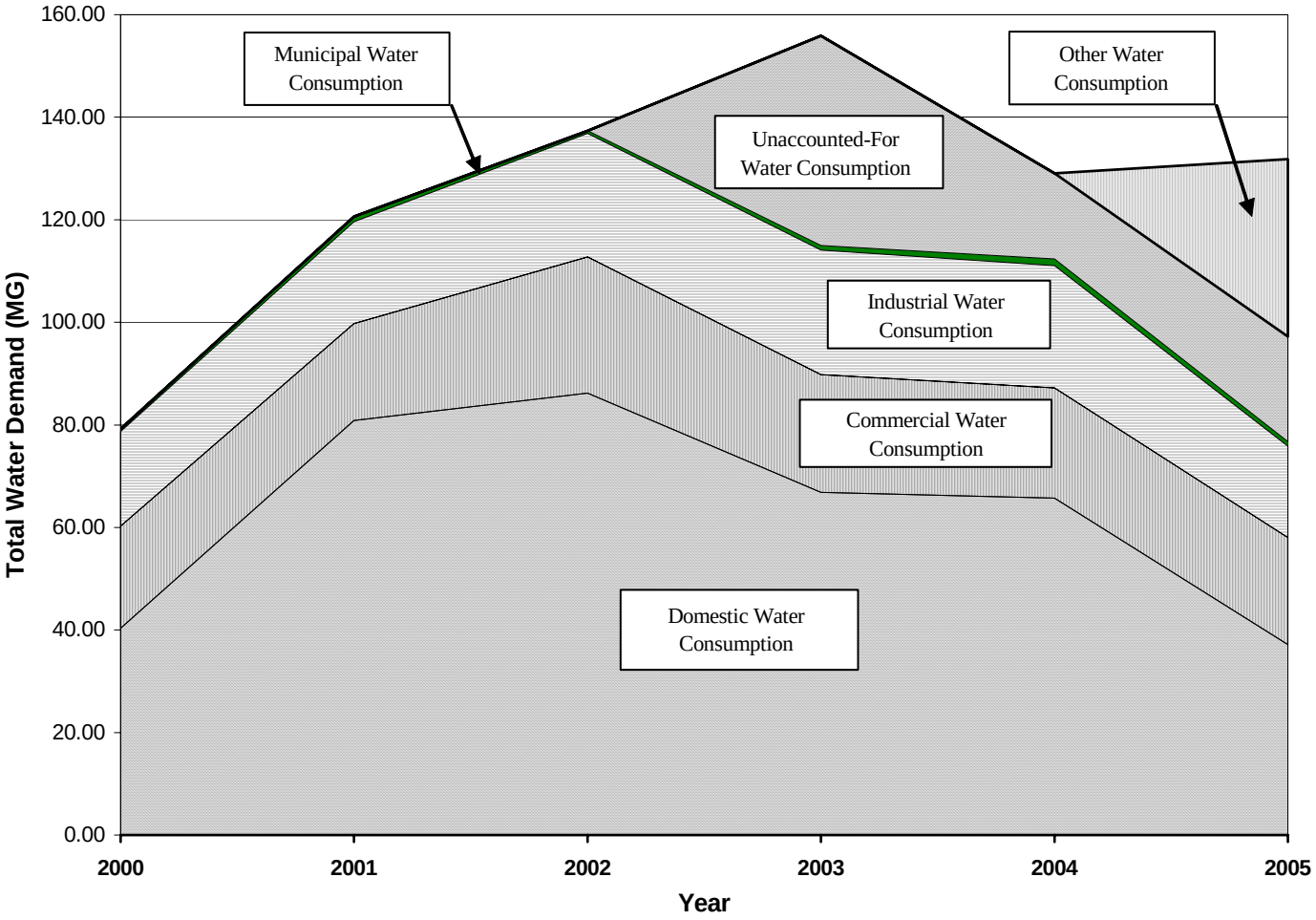
Westminster's total annual water purchase has increased approximately 66-percent from 2000 to 2005, from 79,235,700 gallons to 131,839,200 gallons. The total volume sold refers to the amount of drinking water that the Town sells to two, small water districts located in Town. The total volume consumed is the amount of water consumed within the Town distribution system, not including the separate water districts. The following sections detail historical water consumption by category.

As illustrated in Figure 3-2 – Water Consumption by Category, water consumption can be classified by five different categories. These categories include the following:

- *Domestic* – Water used in residential dwellings for drinking, bathing, sanitation and outdoor use.
- *Commercial* – Water used in retail business, restaurants, and service garages.
- *Industrial/Agricultural* – Water used in manufacturing process plants or in irrigation uses.
- *Municipal* – Water used in municipal buildings such as Town Hall and public schools.
- *Unaccounted-For* – Unmetered water, used in hydrant flushing, fire fighting, water main leaks and inaccurate meters.

The "Other Water Consumption" designation represents the "Total Unmetered/Confidently Estimated" water use as reported in the *MA-DEP Annual Statistical Report – 2005 Addendum* and consists of water use that can be reasonably estimated such as hydrant flushing and water main breaks. This category was only reported in 2005, and over 90-percent consists of a large water main break that started in 2004 and was not discovered until November 2005.

Figure 3-2
Water Consumption by Category



3.4.1.1 Domestic Water Consumption

Domestic water consumption is directly related to the service population and how much water each person consumes, expressed in gallons per day (gpd). Westminster's historical average daily domestic water consumption is presented in Table 3.7.

Table 3.7
Domestic Water Consumption

Year	Domestic Water Consumption (gpd)	Percent of Total Water Purchased
2000	110,140	51%
2001	221,547	67%
2002	236,191	63%
2003	183,130	43%
2004	179,511	51%
2005	101,810	28%

From year 2000 through 2005, domestic water consumption averaged 50.5-percent of the total water consumption. The data indicates a small decline in average daily domestic water consumption from 2002 to 2004 and a large decline in 2005. It is suspected that the 2005 value may be a reporting error. Overall water consumption increased between 2004 and 2005 and other classes of water use were reported to decline slightly. Therefore, it is uncertain as to why domestic consumption declined dramatically. A reduction in residential outdoor water use could be a partial factor.

Domestic water consumption can also be expressed in gallons per capita per day (gpcpd). Since Westminster's population is partially served by the Town water system, it is difficult to obtain the actual service population. Service population estimates provided in the DEP Annual Statistical Reports do not occur each year. A method to estimate the service population that follows guidelines provided in the DEP Annual Statistical Reports utilizes water service connection distribution data. Obtaining the number of residential water service connections from the reports and multiplying it by the average number of persons per household obtained from 2000 U.S. Census data for Westminster (2.73), yields an estimate of service population. Domestic water consumption is then divided by the service population to obtain per capita consumption.

As indicated in Table 3.8, the average per capita water consumption from year 2000 through 2005 was 60.8 gpcpd. However, the data for 2005 appears to be an error and the total number of residential services is not available. Removing this year from the data, the average from 2000 through 2004 was 66 gpcpd. Per capita water consumption has declined significantly since 2002.

Table 3.8
Per Capita Water Consumption

Year	Domestic Water Consumption (gpd)	Residential Water Services	Estimated Service Population	Per Capita Consumption (gpcpd)
2000	110,140	1,022	2,790	39.5
2001	221,547	1,029	2,809	78.9
2002	236,191	1,036	2,828	83.5
2003	183,130	1,040	2,839	64.5
2004	179,511	1,044	2,850	63.0
2005	101,810	1,044	2,850	35.7
Average Domestic Water Consumption (gpcpd)				**60.8**

3.4.1.2 Commercial Water Consumption

Westminster's historical average daily commercial water consumption is presented in Table 3.9. This category consists of various types of commercial establishments; generally all service types that do not fall within the residential, industrial/agricultural, or municipal classes.

Table 3.9
Commercial Water Consumption

Year	Commercial Water Consumption (gpd)	Percent of Total Water Purchased
2000	54,541	25%
2001	51,742	16%
2002	72,644	19%
2003	62,880	15%
2004	58,923	17%
2005	57,235	16%

From year 2000 through 2005, commercial water consumption averaged 17.9-percent of the total water consumption. The data indicates a small decline in average daily commercial water consumption since 2002.

3.4.1.3 Industrial/Agricultural Water Consumption

Westminster's historical average daily industrial/agricultural water consumption is presented in Table 3.10.

Table 3.10
Industrial/Agricultural Water Consumption

Year	Industrial/Agricultural Water Consumption (gpd)	Percent of Total Water Purchased
2000	50,403	23%
2001	54,321	16%
2002	66,095	18%
2003	66,639	16%
2004	65,338	18%
2005	48,823	14%

From year 2000 through 2005, industrial/agricultural water consumption averaged 17.5-percent of the total water consumption. The data indicates consistent average daily industrial/agricultural water consumption from 2002 through 2004.

3.4.1.4 Municipal Water Consumption

Municipal water consumption typically consists of water used at Town buildings and schools; however, due to the limitations of the available data, only consumption for schools is listed separately and provided as "municipal consumption" in this report. Westminster's historical average daily municipal water consumption is presented in Table 3.11.

Table 3.11
Municipal Water Consumption

Year	Municipal Water Consumption (gpd)	Percent of Total Water Purchased
2000	1,407	0.65%
2001	2,810	0.85%
2002	1,344	0.36%
2003	2,264	0.53%
2004	3,532	1.00%
2005	2,451	0.68%

From year 2000 through 2005, municipal water consumption averaged 0.68-percent of the total water consumption. In the last six years, the average daily municipal water consumption has fluctuated within a small range.

3.4.1.5 Unaccounted-For Water Consumption

Unaccounted-for water consumption is determined by comparing the total volume of water supplied to the distribution system (i.e. metered at the source) with the actual amount of water delivered to customers. In 2005, water use that could be reasonably estimated was removed from this category. Westminster's historical average daily unaccounted-for water consumption is presented in Table 3.12.

Table 3.12
Unaccounted-For Water Consumption

Year	Unaccounted-For Water Consumption (gpd)	Percent of Total Water Purchased
2000	Not Reported	0%
2001	Not Reported	0%
2002	Not Reported	0%
2003	112,211	26%
2004	45,698	13%
2005	55,966	15%

As shown on Table 3.12, from year 2000 through 2002, unaccounted-for water consumption was not reported separately. However, the unaccounted-for water was reported as 13-percent of total water purchased in 2004 and 15-percent in 2005. This significant reduction in unaccounted-for water since 2003 is an improvement towards the state goal of 10-percent for public water suppliers.

3.4.1.6 Average Daily and Maximum Daily Demand

Average Daily Demand (ADD) is defined as the average volume of water consumed per day, during the course of the year. The ADD includes all portions of water consumption previously described: domestic, commercial, industrial/agricultural, municipal, and unaccounted-for. Average daily demand provides a baseline and assists in determining overall trends in water consumption.

ADD is a key element in determining the typical water usage for a Town. However, the amount of water consumed will vary on both a seasonal, daily, and hourly basis. For this reason, water consumption is

reported in terms of Average Daily Demand, Maximum Daily Demand (MDD), and Peak Hourly Demand (PHD).

The maximum daily demand is defined as the largest 24-hour demand during the course of the year. The maximum daily demand is a primary consideration in determining the adequacy of the water supply sources. Maximum days often occur consecutively; therefore, water supply systems must be capable of delivering the maximum daily demand. If the yield from the water supply sources were less than the maximum daily demand, the water level in the storage tanks would drop, ultimately jeopardizing system pressures and emergency storage.

Maximum daily demand normally occurs during the hot months of June, July and August as a result of lawn watering, frequent showers, car washing, and swimming pool filling. In efforts to reduce maximum daily demand, the MA-DEP has begun establishing limits on seasonal water use through the Water Management Act modified permits for communities within highly stressed river basins. Maximum daily demand is typically expressed as a ratio of the average daily demand (i.e. *Maximum Daily Demand ÷ Average Daily Demand*).

The magnitude of the maximum daily to average daily demand ratio depends upon the characteristics of the Town. Typically, the maximum daily demand ratio will be greater in residential communities, with low population densities and small amounts of industry. Conversely, highly industrialized, densely populated communities experience a smaller maximum daily demand ratio because large water consuming industries are generally not subject to seasonal fluctuations.

The ratio of maximum daily to average daily demand is determined from the analysis of daily pumping records. Table 3.13 - Maximum Daily Demand, presents Westminster's maximum daily and average daily demands, from year 2000 through 2005.

Table 3.13
Maximum Daily Demands

Year	Average Daily Demand (gpd)	Maximum Daily Demand (gpd)	Demand Ratio
2000	216,491	459,200	2.12
2001	330,419	663,200	2.01
2002	376,273	639,800	1.70
2003	427,176	768,900	1.80
2004	352,528	869,000	2.47
2005	360,216	644,000	1.79
Average Demand Ratio (Maximum Daily ÷ Average Daily)			**1.98**

As indicated in Table 3.13, the maximum daily demand is an average of 1.98 times the average daily demand. The water use trend shows a drastic increase in the demand ratio in 2004. This may be a result of increased outdoor water use during the summer of 2004. However, the Town has implemented outdoor water use restrictions since 2002.

3.4.1.7 Peak Hour Demand

The peak hour demand is defined as the maximum volume of water used within a 60-minute period. The peak hour demand typically occurs in conjunction with the maximum daily demand. Because peak demands can be extremely variable, lasting only for a short duration, it is common water works

engineering practice to satisfy these demands from distribution storage, rather than from supply sources. Consequently, peak hour demand is considered when determining the adequacy of water distribution system storage.

Peak hour demands are typically determined from the analysis of daily pumping records and expressed as a ratio of the average daily demand consumption rate (i.e. *Peak Hour Demand ÷ Average Daily Demand).* The peaking hour demand ratio varies according to the size of the community, the percentage of commercial/industrial use and the percentage of residential use. As with maximum daily demand, the more industry a community has the lower the peak hour demand ratio. Westminster's service type distribution indicates approximately 51% residential and 49% commercial/industrial/municipal users. When hourly pumping data is unavailable, peak hour demand is estimated by multiplying the average demand ratio by 1.5. The peak hour demand for Westminster is estimated to be 2.97 times the average day-hourly demand (average daily demand ÷ 24 hours) using this method.

3.4.2 Water Conservation

Water conservation is one of the key areas to reduce Westminster's overall water demand. Over the past years Westminster has been implementing many water conservation efforts. However, there are areas where Westminster can improve its water conservation efforts. The 1992 *Water Conservation Standards for the Commonwealth of Massachusetts* provides policies for the planning and management of water resources. The Massachusetts Water Resource Commission suggests the following topics to be addressed for water conservation:

- Public Education
- Leak Detection
- Metering
- Pricing
- Residential Water Use
- Public Sector Water Use
- Industrial and Commercial Water Use
- Water Supply Management

3.4.2.1 Existing Conservation Efforts

The Town conducts the following programs or efforts to reduce water consumption:

- Approximately 97-percent of the water system is metered, including all municipal buildings. The remaining 3-percent consist of broken residential meters. There is an on-going meter replacement program that replaces residential meters with new, remote-read meters each year. Large industrial meters are owned by the users.
- The Water Department calibrates its master meters bi-annually in accordance with American Water Works Association (AWWA) guidelines.
- The Town Water Department maintains an annual leak detection program, in which approximately 10-percent of the water system is surveyed for leaks each year. Leaks are repaired upon discovery.
- Water savings devices and fixtures were recently installed in all municipal buildings.

- The Town makes water savings devices available to customers for purchase.
- The Town has a water use restriction by-law that was approved by the MA-DEP. The by-law is mandatory when in effect, and generally follows the timing of restrictions in Fitchburg.
- The Water Department provides conservation information to residents and users in the form of flyers and water bill stuffers.

These efforts have proved to be effective based on the 50-percent reduction in percent unaccounted-for water from 2003 to 2004. However, based on the short period for which estimated unaccounted-for water use is provided, long term success of these programs is uncertain. The Town should also strive to maintain unaccounted-for water at or below the state goal of 10-percent.

3.5 Potential Sources of Contamination

As detailed, the Regional Water Filtration Facility obtains surface water supply from within the boundaries of Westminster. In addition, several groundwater supply wells are located within Westminster, where a release of oil and or hazardous material has the potential to impact the water supplies. Potential sources of contamination include facilities that generate hazardous waste, underground storage tanks, and specific land uses. The Source Water Assessment Program (SWAP), completed in July 2002 by the Department of Environmental Protection for the Fitchburg DPW - Water Division, indicated a high susceptibility for contamination in the surface water supply protection areas due to land uses within the Zone C. The highest threat indicated in the SWAP report was aquatic wildlife which may introduce microbial contaminants into the surface water supply. Moderate threats included Fuel Oil Storage, Lawn Care/Gardening (due to the potential for excessive application or improper disposal), and the location of septic systems and cesspools. Transportation corridors located adjacent to the water supplies were also identified as potential threats for contamination. Potential contamination results from construction and maintenance activities as well as accidents which can lead to spills of gasoline or other chemicals.

3.5.1 Existing Regulations

To prevent future contamination, the Town has developed regulations controlling disposal and containment of potentially hazardous chemicals. The Westminster Board of Health Regulations prohibits the discharge of toxic or hazardous materials within Town. The regulations do no allow outdoor storage of these materials either, unless stored properly.

The regulations also provide restrictions on the construction of on-site septic systems within watersheds of surface water supplies in Town, as detailed in the Existing Wastewater Management chapter of this report. These restrictions supersede Title 5 regulations to further protect public health and resources.

3.6 Water System Operation and Maintenance

3.6.1 Intermunicipal Agreement

The IMA between Fitchburg and Westminster, dated May 26, 1999, provided for the construction of the Regional Water Filtration Facility located on a 15-acre site along Hager Park Road in Westminster to serve both the City of Fitchburg and the Town of Westminster. The site was conveyed to Fitchburg from Westminster in exchange for a 69-acre parcel known as the Smith Reservoir parcel, which is used by Westminster as park land. The agreement is intended to remain in place for the operational lifetime of the treatment plant, but no less than 20-years.

Under the agreement, the treatment plant is to provide water supply that meets the Massachusetts drinking water quality standards to a pump station located on the site that serves the Westminster distribution

system. Construction of the pump station, referred to as the Hager Park Pump Station, is included in the IMA.

The agreement allows Westminster to initially obtain a maximum daily flow up to 870,000 gpd (0.87 mgd) as "Committed Capacity." This amount is measured based on use over the preceding 12-month period. Under the agreement, the Town can exceed this usage for a total of seven days in a calendar year without triggering requirements to renegotiate overall cost sharing with Fitchburg. For the purposes of the previous stipulation, only water used for consumption shall be included in the usage measurement. Water used for non-consumptive uses such as fire fighting and water main breaks shall not be included.

The agreement provides Westminster for the right to a maximum daily flow up to 1,500,000 gpd or 1.5 mgd in the future as "Reserve Capacity." Supply above this amount is referred to as "Excess Capacity." Fitchburg reserves the right to sell these amounts to other communities; however, the agreement requires the City to provide advance notice to Westminster prior to doing so. Under the agreement, Westminster has the right to refuse sale if it should need the additional capacity.

The costs to Westminster for the water supply consist of a portion of the treatment plant capital cost and the operations and management cost for water used. The capital cost consists of costs to construct the plant, pump station, piping, and related systems as well as engineering, legal, and administrative costs. These costs are assessed based on a ratio of Westminster's maximum capacity allotted from the plant divided by the overall capacity of the plant. Payment to the City follows the City's debt payment schedule for the plant construction. If Westminster's maximum capacity is increased above the initial 0.87 mgd, these costs will then increase proportionately. Operations and management cost for the plant is based on the actual cost to operate and maintain the plant and is assessed monthly based on a ratio of Westminster's actual usage divided by the total plant usage for the month.

3.6.2 Water Use Rules and Regulations

The Westminster water rates (as of January 2005) for its customers were enacted approximately 10-years ago and are the same for all user classes. They are based on a rate of $75 per 20,000 gallons of water use, which equates to $3.75 per 1000 gallons ($2.81 per 100 cubic feet). If 20,000 gallons of water use is exceeded in the billing period, additional usage is charged at $5 per 1000 gallons ($3.74 per 100 cubic feet). Users are billed quarterly, semi-annually, or annually based on the class and type of user.

The Water Department maintains regulations that govern installation, connection, and consumption of water from the system. The Town regulations require a permit application process for connecting into the water system. The regulations also provide the Water Superintendent the opportunity to review the permit application and any applicable plans and details, as well as inspect the construction of the water connection/extension for conformance with the regulations. The costs for review and inspection of a new water connection are charged to the applicant.

The Subdivision of Land Regulations maintained by the Westminster Planning Department address connections to the Town water system for new development in the section regarding utilities installations. The regulations identify that connections to existing water systems shall be made if there is adequate capacity to serve the subdivision. If there is inadequate capacity to serve the entire subdivision, only a portion that can be accommodated shall be allowed to connect.

The regulations also require that the water main extension be continued to the extents of the development with adequate size to serve existing undeveloped areas adjacent to the subdivision, where applicable.

3.7 Private Water Supply Wells

Based on Town assessors information and water use records, there are approximately 1,570 residences within the Town of Westminster that utilize on-site water supply wells for drinking water, as of January 2005. This comprises just over 60-percent of the residences in Town, with the remaining residences connected to the municipal water system. There are on-site wells within Town that serve commercial establishments as well. Industrial establishments within Town are connected to the water system. There may be additional private wells in Town that are used solely for irrigation purposes.

The Westminster Board of Health Regulations govern the installation, use, and monitoring of private wells. The regulations require a permit for installation, repair, or abandonment of a private well in Town. For new well construction, the permit must include a plan of the proposed installation, showing that the well location meets the required setback distances from certain features as set forth in the regulations. Well drillers must be licensed with the State, and well construction must follow U.S. Environmental Protection Agency standards. The regulations require that new wells be disinfected after installation, and that a bacteriological sample be taken at the end of an initial four-hour pump test. The water quality must meet specific standards and samples must be tested for specific parameters, as set forth in the regulations. The regulations require a treatment system if the water quality is not acceptable. The Board of Health recommends that owners test their wells for water quality at a minimum of once every two years, and submit the results to the Board of Health for review.

The regulations require a yield test for every new well. This test measures drawdown in the well and the well capacity. Wells with a capacity below 5 gpm require a special permit for approval. New wells cannot be used and building permits are not issued until the Board of Health has approved the well. The Board has the right to grant a variance to the regulations when the applicant has satisfactorily proved that it will not compromise public health and the environment.

Existing wells must be abandoned with specific methods. The regulations required that a representative from the Board of Health inspect the site and submit a report to be recorded at the Registry of Deeds once the well has been abandoned.

The Town Board of Health data contains records regarding existing private wells in Town, including well installation permits and water quality sampling results. Well depth and capacity information, obtained from well installation permits, has been placed into a spreadsheet by the Board of Health. Based on this information, private well depths in Town range from 25-feet to 920-feet, and the average depth is approximately 370-feet. Private well capacities range from 0 gpm to 305 gpm, and the average capacity is approximately 13 gpm.

The 2002/2003 Westminster water and sewer billing records indicate that there are approximately 44 residential sewer accounts that have private wells for water supply. Of this amount, 34 accounts are metered for actual usage. This data was reviewed for water use trends. It appears that based on this limited amount of data, domestic water consumption from private wells is significantly less than domestic water consumption from the municipal water system. Average daily water use per billing account is just less than half of the average daily water use per municipal water service. Therefore, per capita water use of residents with private wells is also just less than half of the per capita water use of residents receiving Town water. The cause for this water use trend is not certain. Possible reasons are that private wells may have supply or pressure limitations, which could cause a reduction in overall water use by the user. The user may also have an additional on-site well for irrigation purposes, thereby completely eliminating the outdoor water use component from the metered amount.

4. Wastewater Management Needs Analysis

4.1 Introduction

One of the primary goals of the Comprehensive Wastewater Management Plan (CWMP) is to develop an integrated wastewater management plan, potentially consisting of both constructed facilities and recommended regulations. In the absence of a Town-administered wastewater management program based on this CWMP, Massachusetts Title 5 regulates on-site wastewater management. Therefore, in the context of a CWMP, a Wastewater Management Needs Analysis must identify locations where, cumulatively, Title 5 management of on-site wastewater disposal systems may cause a risk to public health, create a potential risk to natural and water resources, and/or create a significant financial burden for property owners. Conversely, the goal of the needs analysis is to identify areas where Title 5 management meets the Town's goals, and no further analysis is required. A determination of "Need" for any particular location does not presuppose that sewers should be extended to that location. Rather, alternative solutions for areas deemed to have "Need" are to be analyzed in detail in a subsequent chapter of the CWMP.

The primary determination of "Need" is based on the physical characteristics of an area. These characteristics include soil type, depth to groundwater, topography, and proximity to environmental resources. Factors such as subsurface disposal system age and reported Title 5 failures provide secondary information in the needs analysis. Systems may fail, but if conditions are suitable, Title 5 replacements may cost-effectively solve the problem. However, if conditions are inadequate to support the demands of the current or planned land uses, Title 5 subsurface disposal systems can cause problems. There are two scenarios under which conventional Title 5 systems may not effectively protect public health and environmental resources. Localized problems occur where system effluent cannot percolate into the ground which can cause nuisance or public health problems for the homeowners in that location. Remote problems occur where geologic conditions do not adequately filter system effluent prior to contact with environmental resources such as surface water bodies. The needs analysis presented herein focuses on likely problem locations in Westminster, and areas for which Title 5 should provide adequate wastewater management. The subsequent Wastewater Alternatives Analysis will explore alternative wastewater management systems for areas determined to have need. No further analyses will be conducted for where Title 5 is adequate.

4.2 Delineation of Study Areas and Parsing of Data

The first step in the needs analysis was to define areas with homogeneous physical characteristics. Study areas included both developed and undeveloped unsewered locations. Locations currently served by sewers were specifically excluded from the needs analysis. Similarly, significant areas of wetlands were also identified and removed from the analysis, as those areas are not developable. Finally, large areas which are currently owned by the Westminster Conservation Commission or the Massachusetts Department of Conservation and Recreation consisting of protected forest or park land were identified and removed from the analysis, as these areas are unlikely to be developed. Delineating the study areas was a progressive process of overlaying different mapping information. The mapping information and data considered included: Massachusetts Geographic Information Systems (MassGIS) statewide datalayers; MassGIS color digital orthophoto (aerial) images; Town of Westminster GIS information (digital parcel data); the Westminster Zoning By-Law; United States Geological Survey (USGS) topographic mapping, and the *Interim Soil Report for Northwestern Worcester County Massachusetts*. A discussion of the different mapping information and data sources is provided in the following subsections.

Geologic conditions in Westminster are consistent, aside from areas within close proximity to surface waters, rivers, and wetlands. Therefore, development density and zoning designation were used as a

primary tool for delineating study areas, along with environmental resources. A total of 25 study areas were identified. The study areas were numbered and named based upon the major roadways and type of development within. Figure 4-1, attached at the end of this report (prior to appendices), illustrates the locations of the study areas within Westminster.

The second step of the needs analysis was to compile and examine the available information for each study area. As described in the following subsections, GIS tools were employed extensively to parse the general data into data sets for each study area. The sections below summarize the available data sources used to assess the physical characteristics and wastewater conditions for each study area.

4.2.1 Extent of Existing Development

The extent of existing development was determined by reviewing the existing parcel data provided by the Town Assessors office through GIS. The data provided shows parcels and approximate building locations within parcels.

4.2.2 Zoning

The zoning classification within each study area was determined using the Westminster Zoning By-Law dated November 2001. The predominant zoning classification was determined and noted, as well as any additional substantial zoning classifications within the area.

4.2.3 Lot Size Characteristics

The total number of parcels within each study area and the lot size of each parcel were determined using the Town GIS assessor's datalayer. Five categories for existing lot size were established for analysis based on the general level of difficulty of constructing an on-site subsurface disposal system. The categories include: lots smaller than 5,000 square feet (s.f.) in size; lots between 5,000 s.f. and 10,000 s.f. in size; lots between 10,000 s.f. and 20,000 s.f. in size, lots between 20,000 s.f. and 1 acre in size and lots larger than 1 acre in size. The number of existing lots within each category was determined and summarized for each study area. The Town GIS assessor's datalayer used in this analysis was last updated in 2004; therefore, development from 2004 to present has not been included in the lot size analysis.

4.2.4 Environmental Resources

Environmental resources, including wetlands, surface waters, rare species habitats, and vernal pools, were obtained from MassGIS statewide datalayers. The wetlands datalayer was created from photo interpretation and checked by the DEP Wetlands Conservancy Program. The surface water coverage was a category within the wetlands datalayer and represents substantial surface waters within the Town. This coverage does not include small streams and brooks that are subject to running dry, and that are not easily discernable through photo interpretation. The rare species habitat datalayer is based on rare species population records maintained in the Natural Heritage & Endangered Species Program (NHESP) database and represents estimations of important state-listed rare species habitats in Massachusetts. Both certified and potential vernal pools datalayers were investigated in the analysis. The certified vernal pools datalayer represents all vernal pools which have been certified by the NHESP according to the vernal pool certification guidelines. Study areas containing certified vernal pools were identified as such in the summary. The potential vernal pools datalayer represents potential, unverified vernal pools interpreted from aerial photography. Using these datalayers, the presence and extent of these environmental resources was determined and summarized within each study area.

4.2.5 Drinking Water Resources

The Zone A and Zone B Surface Water Supply Protection Zones were obtained from the MassGIS statewide datalayer. Surface Water Supply Protection Zones have been delineated based on the MA-DEP Massachusetts Drinking Water Regulations. These zones serve to protect the public surface water supply from the detrimental effects of certain land uses and activities. The Zone A protection area consists of a region 400-feet from the edge of the reservoir and 200-feet from the edge of any tributary feeding the reservoir, as defined by the regulations. The Zone B protection area is defined as the region extending one-half mile from the edge of the reservoir, unless bound by the edge of the watershed. The degree of coverage within each study area was determined. These zones were included in the analysis as they are the most critical. The Zone C consists of the remaining area within the watershed of a surface water resource.

4.2.6 USGS Surficial Geology

Surficial geologic conditions were analyzed for each study area within Town. The mapping was acquired from the MassGIS surficial geology datalayer. This datalayer is based on the USGS surficial geology maps and identifies three parent geologic materials within Town: glacial till, sand and gravel deposits, and floodplain alluvium. Glacial till is defined as unsorted and unstratified debris deposited by a glacier; consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders. Glacial till is generally not permeable and generally presents problems for disposal systems as the effluent cannot pass through the material. Sand and gravel deposits consist of well sorted, stratified sands and gravel, with very little silt and clay. The material is loose and generally lacks stones and boulders. In general, sand and gravel is extremely permeable, but does not typically provide substantial treatment of disposal system effluent. Floodplain alluvium consists of material transported and deposited by present day streams and rivers. It is well sorted, fine textured material that is susceptible to seasonal flooding. The amount of each parent material contained in the study areas was calculated and summarized for all study areas in the analysis.

4.2.7 NRCS Soil Classifications

The *Interim Soil Report for Northwestern Worcester County Massachusetts*, prepared by the Northwestern Worcester Conservation District in cooperation with the USDA – Natural Resources Conservation Service was used to identify soil types in the Town of Westminster. The interim soil survey is available in advance of the final report, which is an update of the Worcester County soil survey that was published by the USDA in 1927. The data obtained was converted into digital GIS format to facilitate the soil analysis within each study area.

The soil survey classifies each soil based upon its limitation for use in subsurface wastewater disposal, as slight, moderate, or severe. Virtually all soils within Town are identified as having severe limitations, which is defined in the soil survey as "soil properties or site features so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required." The ratings also provide a description of the dominant soil condition, which was used to establish four categories of severe soils within Town. The severe soils categories include: soils that percolate slowly; poor filter soils; soils subject to flooding, ponding, and wetness; and miscellaneous limitations. Miscellaneous limitations consist of severe slope, shallow depth to bedrock, or excessive boulders within the soil. Soils that percolate slowly are defined in the soil survey as causing "slow movement of water through the soil adversely affecting the specified use." The poor filter soil condition is defined as "soils having a rapid permeability"; therefore, the soils "may not adequately filter effluent from a waste disposal system." Soils subject to flooding, ponding, and wetness are defined as "soils flooded by moving water from stream overflow, runoff, or high tides," soils having "standing water on soils in closed depressions," and "soils wet during period of use," respectively.

4.2.8 Board of Health Installation Database

The Town Board of Health maintains a database that contains subsurface disposal system and private well records. S E A acquired this database to assist in the analysis. Development of the database began in December 2004 based on existing Board of Health data and was approximately 90% complete when obtained for the analysis. The data for on-site subsurface disposal systems consists of the date of system installation or most recent reconstruction, percolation rates, and depth to groundwater. Data related to private wells includes well depth and reported flow rate. The predominant conditions for subsurface disposal systems and private wells were identified for all study areas and summarized.

The percolation rate and groundwater depth information included in the database is based on comprehensive actual data from subsurface disposal system soil testing. In most cases, if a study area did not have complete percolation rate or groundwater depth information, data from adjacent study areas was available. The data generally confirmed USGS surficial geology and NRCS soil classifications within study areas.

4.2.9 Subsurface Investigations

Subsurface investigations were conducted in several study areas in Town to identify soil and groundwater conditions. The Town GIS assessor's datalayer was used to locate potential Town-owned parcels for conducting investigations. Subsequent field surveys determined that six of the parcels were favorable for conducting exploratory excavation. These parcels are located in Study Areas 4, 7, 13, 18, 20, and 21 and the investigations included soil classifications, groundwater observations, and percolation testing to compare with data contained in the Board of Health installation database.

The results of the investigations indicate that percolation rates and groundwater depths in most of the study areas tested are generally near or within the ranges recorded in the Board of Health installation database, and are summarized as follows:

- Site 1 – Study Area 4 – Loamy sand; groundwater observed at 9-feet; percolation rate is less than 2 minutes per inch (mpi).
- Site 2 – Study Area 7 – Silt loam; groundwater observed at 6-feet 4-inches; percolation rate is greater than 60 mpi.
- Site 5 – Study Area 20 – Gravelly sandy loam; groundwater observed at 7-feet 8-inches; percolation rate is less than 2 mpi.
- Site 6 – Study Area 18 – Loamy sand; groundwater observed at 10-feet 3-inches; percolation rate is less than 2 mpi.
- Site 7 – Study Area 13 – Loam; groundwater observed at 9-feet; percolation rate is 10 mpi.
- Site 8 – Study Area 21 – Gravelly loamy sand; groundwater observed at 2-feet 10-inches; groundwater depth did not allow percolation test.

Subsurface conditions in Town are quite variable; therefore, percolation rates and groundwater depths recorded in the Board of Health installation database for adjacent study areas did vary significantly. The results of the site review and the investigations are attached to this report in Appendix B. The appendix also includes the locations of the sites.

4.2.10 Limit of Municipal Water Service

The limits of the existing Town water distribution system were identified based on the water distribution system map provided in the *Water System Analysis*, completed by Earth Tech, Inc. and dated March 1996. The system map was converted into digital GIS format to identify the extent of Town water within each study area. The DPW Director was consulted to identify water system extensions since 1996. A

significant extension that connects the Town water distribution system to the Regional Water Filtration Facility on Hager Park Road was noted in the analysis.

The number of private drinking water wells located within each study area was determined by assuming that areas not serviced by Town water or by private water districts rely on private wells for drinking water.

4.2.11 Board of Health Files

A review of the Town Board of Health files for developed lots was completed for specific areas of Town with known problems. These areas were identified by Town officials as known problem areas, meaning variances from regulations are frequently needed to install systems, tight tanks are known to exist, or site limitations lead to costly systems. S E A reviewed the Board of Health files in these specific areas for types of existing systems and soil conditions if reported during system installation. Title 5 failures, locations of tight tank installations, and variances were also identified. This information was used to support assessments of the known problem areas.

4.2.12 Board of Health and Local Installer Information

Supplemental subsurface disposal system information was acquired through discussions with the Town DPW Director, Town Health Inspector, and local system designers and installers who design and/or perform much of the system installations and repairs in Westminster. The information was gathered to further assist in refining the desk-top data, and included the relative difficulty and cost of installing subsurface disposal systems and conditions affecting installation in study areas.

4.2.13 Visual Surveys

Visual surveys were performed for certain areas in an attempt to refine the data obtained from other data sources. The surveys were performed in areas identified as known problem areas to confirm physical conditions and development characteristics within.

4.3 Wastewater Needs Assessment Methodology

The third step of the needs analysis was to interpret how physical characteristics relate to the likely performance of Title 5 subsurface disposal systems in each study area. For the purposes of the assessments, three categories of physical information, or criteria, were considered to yield preliminary wastewater need assessments. Scores were assigned to each criterion to indicate the probable severity of the problem with Title 5 management. The scoring ranged from one to five with higher scores representing more severe conditions.

The criteria were reviewed to predict the two likely modes of failure (i.e. localized or remote). Localized problems occur where system effluent cannot percolate into the ground and can cause nuisance or public health problems for the homeowners in that location, and remote problems occur where geologic conditions do not adequately filter system effluent prior to contact with environmental resources such as drinking water or where system failures can impact surrounding environmental resources.

The preliminary assessments were then refined using two additional categories of information to arrive at final need assessments. These are supplemental data and zoning classifications. The following subsections detail the criteria and how they were evaluated.

4.3.1 Probability of Problems Based on Subsurface Characteristics

Subsurface conditions, such as soil type, depth to groundwater, and percolation rates are the best predictor of likely system performance. Scores were assigned to each of the previous physical properties to

determine where adequate conditions exist to install and maintain Title 5 systems, and where limitations exist.

Soil conditions were scored based on the USGS Surficial Geology data and NRCS Soil Classifications. Higher scores were given to those soils which were identified as poor for system construction, with significant limitations. Depth to groundwater and percolation rate information was based on the Board of Health installation database and the subsurface investigations. Those study areas with predominantly shallow depth to groundwater were given a higher score as these conditions affect system design and may not allow adequate treatment of wastewater through the subsurface soils before reaching groundwater. Percolation rates were rated based on the ability to adequately filter and adequately discharge system effluent. If the soil percolation rates are very fast (less than two minute per inch) or very slow (greater than 60 minutes per inch) it will not be possible to install a typical-sized subsurface disposal system on the site.

4.3.2 Probability of Problems Based on Secondary Characteristics

Scores were assigned to the extent of existing development criteria based on the number of built-out lots within each study area. Although this is not a primary criteria of wastewater need, it does serve as a differentiator between study areas, as areas with less development are likely to pose a lesser threat to public or environmental health than areas that are completely developed. If significant undeveloped area was identified within study areas, zoning classification was reviewed for potential future wastewater need, as explained subsequently in this section.

Based on the lot size characteristics for on-site system construction discussed above, higher scores were assigned to developed areas with many small lots and lower scores were assigned to areas with predominantly larger lots.

Private drinking water wells reduce available land area on a lot for construction of an on-site system. A malfunctioning system can have negative impacts to the water quality of a well. Therefore, higher scores were assigned to study areas utilizing private wells for drinking water supply.

4.3.3 Presence of Environmental Resources

As previously described, wetlands, vernal pools, and NHESP rare species habitat were inventoried for each study area. Higher scores were assigned to areas containing or immediately adjacent to these resources, and low scores were assigned for areas with few or no environmental resources.

Scores were assigned to the *surface water/drinking water resources* criterion based on the presence of surface water and/or a Zone A or Zone B Water Supply Protection Zone within or adjacent to each area. A high score would be assigned to areas containing a Zone A and Zone B drinking water source protection zone, and lower scores were assigned to areas with varying extents of surface water bodies not used for drinking water supply. The lowest score was assigned to any area that is not located near substantial surface water.

4.3.4 Supplemental Data

Additional on-site system data such as plans, installation permits, pump-out records, locations of tight tanks, and Title 5 inspection records were acquired from the Board of Health files for areas in Town identified as problematic by the Health Agent. Information regarding on-site system installation difficulty, typical installation cost, and performance for areas of Town was acquired through interviews with Town officials, local subsurface disposal system designers, and local system installers. Scoring was not developed from the supplemental data. It was used to verify the preliminary need assessments

derived from physical characteristics, if available. Conditions observed during visual surveys were also used to confirm physical characteristics of areas.

4.3.5 Zoning Classification

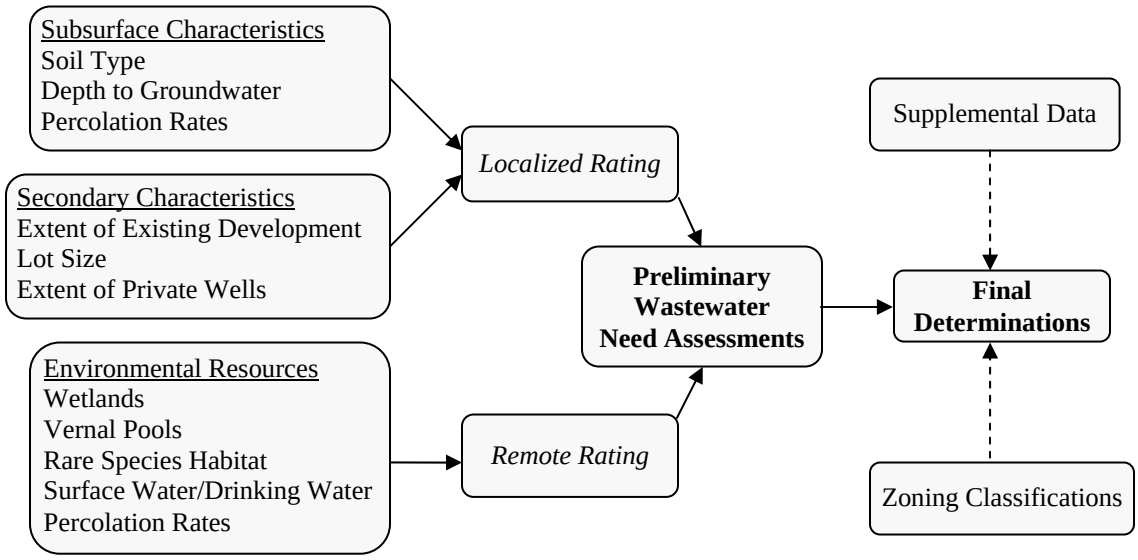
The Town has significant undeveloped land area remaining; consequently, the zoning classification(s) of each study area is an important and possibly overriding factor in assessing wastewater management needs. For instance, a study area containing large, undeveloped areas that are zoned for future industrial use clearly presents a potential wastewater need even if physical conditions are not overly severe. On the contrary, an area with undeveloped land that is zoned for future residential use may not present a wastewater need if the conditions generally support that use. Therefore, zoning classification was reviewed for each study area and considered in arriving at the final need assessments. Current zoning was assumed to remain constant throughout the planning period.

The Town Planner was consulted for existing plans for public development and/or affordable housing (senior and family), which was also considered under this criterion. If Town plans within a study area could potentially be impacted by wastewater management capacity, it was noted in the analysis and considered in the wastewater management alternatives phase of the report.

4.3.6 Wastewater Needs Determinations

For the purpose of determining preliminary needs assessments, a scoring table was created to identify and rate those criteria detailed above in each study area. A needs analysis worksheet, containing the scoring table and preliminary assessments, is attached to this report as Appendix C. The project team reviewed the criteria scores for each study area individually to determine the potential for localized problems and/or remote problems. The subsurface soil and groundwater characteristics were the primary basis for determining the localized conditions, and other criteria such as lot size, existing development density, and extent of private wells were used secondarily to yield a localized rating. Remote conditions were rated based on proximity to environmental resources and public drinking water supplies. This rating was interconnected with the localized rating to determine the wastewater need rating and a preliminary assessment. Figure 4-2 illustrates the process of determining wastewater needs assessments.

Figure 4-2
Wastewater Needs Assessment Methodology



Preliminary wastewater need assessments developed from the criteria were reviewed using available supplemental data and zoning classifications. This data was assumed to have a greater accuracy with respect to specific areas of Town and provided a means of checking the ratings based on criteria. It also assisted in developing a priority ranking of wastewater needs areas once the needs analysis was complete. The preliminary assessments were translated to word scores that range from very low to high for inclusion in this report.

The wastewater needs assessment methodology interprets how existing conditions and physical characteristics in Town relate to the likely performance of subsurface disposal systems in each study area. The methodology considers both existing development and undeveloped areas. Future development conditions are an important factor in determining overall wastewater need, and may override preliminary assessments based on criteria. Therefore, zoning classifications and planned development considerations, such as affordable housing units, were considered to predict future wastewater management needs, and to modify preliminary assessments where appropriate before arriving at final determinations.

Final wastewater need determinations will be reviewed in the subsequent Wastewater Alternatives Analysis to consider appropriate management alternatives. For example, an area with a high score for remote problems (i.e. higher likelihood of remote problems) and a low score for localized problems (i.e. lower likelihood of localized problems) may represent an area where Title 5 is an effective long term management strategy with a subsurface disposal system inspection or monitoring program in-place; however, an area with a high score for remote problems and a high score for localized problems would represent an area with a need to study constructed wastewater alternatives.

4.4 Study Area Descriptions and Needs Assessments

The following subsections summarize the individual study areas and provide the assessments for the need to study wastewater alternatives based on the methodology. The summaries indicate those criteria which rated high in the process and are significant reasons for the need to study alternatives.

4.4.1 Study Area 1 - North Westminster

The North Westminster Study Area covers the northern portion of Westminster, north of Ashburnham Road (Figure 4-1). It is a very large study area encompassing approximately 3,830 acres and 311 lots, and is partially developed. The area is completely zoned residential R-II, requiring a minimum lot size of 60,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 5.5 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 1
Localized Problems
❑ Soil Type: Nearly all till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Proximity to Vernal Pools: Vernal pools identified in area ❑ Proximity to Rare Species: Rare species habitat identified in area
Additional Considerations
❑ None

The area consists of predominantly glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The area relies entirely on private on-site wells for water supply. The area contains some wetlands and surface waters. Certified vernal pools were identified within the study area as was a significant area of rare species habitat. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Existing and future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.2 Study Area 2 – Ashburnham Road

The Ashburnham Road Study Area covers the north central portion of Westminster, along the Whitman River (Figure 4-1). It is a large study area encompassing approximately 1,148 acres and 274 lots. The land located along Ashburnham Road is moderately developed, however there are large parcels of undeveloped land throughout the study area. The area is completely zoned residential R-II, requiring a minimum lot size of 60,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 4.2 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **moderate** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 2
Localized Problems
❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Soil Type: Nearly all sand and gravel ❑ Percolation Rate: Generally rapid ❑ Surface Water: Surface water throughout area ❑ Proximity to Vernal Pools: Vernal pools identified in area
Additional Considerations
❑ None

The area consists of predominantly sand and gravel subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid to moderate (2 to 5 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in adjacent Study Area 4 yielded a percolation rate within the range identified in the Board of Health database for this study area, but the observed groundwater depth was significantly deeper than the range identified in the database. The area relies entirely on private on-site wells for water supply. The area contains some wetlands and surface water, including the Whitman River. Certified vernal pools were identified within the study area. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

While environmental resources are present, physical conditions in the study area do not promote localized problems. Lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Although the area scored a moderate assessment of need, existing and future lot sizes in this study area minimize impacts to resources provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.3 Study Area 3 – State Road East Industrial

The State Road East Industrial Study Area is located in the northeast portion of Westminster, just South of Ashburnham Road (Figure 4-1). The study area encompasses approximately 547 acres and 26 lots, and is virtually undeveloped. The area is mainly zoned industrial I-I, requiring a minimum lot size of 40,000 square feet and partially zoned residential R-II, requiring a minimum lot size of 60,000 square feet for new development. Almost all of the lots in the study area are greater than 1-acre, with an average lot size greater than 21 acres. The area has significant potential for future subdivision of lots, at a greater development density than that which currently exists.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. However, the zoning classification suggests additional evaluation may be warranted. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 3
Localized Problems
❑ None
Remote Problems
❑ Soil Type: Nearly all sand and gravel ❑ Surface Water: Located adjacent to Whitman River
Additional Considerations
❑ Industrial zoned area

The area consists of mostly sand and gravel subject to rapid percolation rates. The Board of Health database does not contain information for the area; however, information from adjacent areas indicates that percolation rates may be generally rapid to moderate (2 to 5 minutes per inch) and that groundwater depths may be shallow (4 to 6 feet). The area has partial access to municipal water supply. The area contains some wetlands and surface water, including the Whitman River. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Lot sizes in the area are large; however, installing Title 5 systems or small treatment plants for industrial uses will pose challenges. Wastewater loads from future industrial development in the area can cause negative impacts to nearby environmental resources as well.

Future industrial development has the potential for significant impacts to the area and the nearby resources. Although the area scored a low assessment of need, the current zoning classification warrants special attention. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.4 Study Area 4 – Town Farm Road

The Town Farm Road Study Area is located in the north-central portion of Westminster, north of Route 2 (Figure 4-1). It is a large study area encompassing approximately 1,182 acres and 334 lots, and is moderately developed. The area is partially zoned residential R-I, requiring a minimum lot size of 50,000 square feet and partially zoned R-II, requiring a minimum lot size of 60,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 3.5 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **moderate** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 4
Localized Problems
❑ Soil Type: Nearly all till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Very shallow ❑ Existing Development: Mostly developed ❑ Presence of Private Wells: Most of area utilizes private wells
Remote Problems
❑ Proximity to Vernal Pools: Vernal pools identified in area ❑ Proximity to Rare Species: Rare species habitat identified in area
Additional Considerations
❑ None

The area consists of predominantly glacial till soils subject to slow percolation rates with some sand and gravel deposits. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). The subsurface investigation conducted in Study Area 4 yielded a more rapid percolation rate than the range identified in the Board of Health database and the observed groundwater depth was much deeper than the range identified in the database. A large portion of the area relies on private on-site wells for water supply. The area contains some wetlands. Certified vernal pools were identified within the study area as well as a significant area of rare species habitat. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Groundwater depths for certain areas may not be as shallow as the Board of Health database indicates based on the results of the subsurface investigation in the study area. Lot sizes are large and this substantially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Although the area scored a moderate assessment of need, existing and future lot sizes should minimize that need provided current zoning is not altered significantly. Groundwater may cause Title 5 design and installation challenges for particular lots in the area; however, lot sizes should allow them to be overcome. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.5 Study Area 5 – Route 140 Commercial

The Route 140 Commercial Study Area is located in the west-central portion of Westminster, along the town-boundary (Figure 4-1). It is a small study area encompassing approximately 284 acres and 65 lots, and is partially developed. The area is partially zoned residential R-I, requiring a minimum lot size of 50,000 square feet and partially zoned C-I, requiring a minimum lot size of 40,000 square feet for new development. Many of the lots in the study area are between 20,000 s.f. and 1-acre and the remainder are greater than 1-acre, with an average lot size of approximately 4.4 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 5
Localized Problems
❑ Soil Type: All till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Most of area utilizes private wells
Remote Problems
❑ None
Additional Considerations
❑ Mainly commercial zoned area

The area consists of glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). A large portion of the area relies on private on-site wells for water supply. The area contains some wetlands. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems. A majority of the lot sizes are large. Future commercial development along West Main Street may pose some challenges in installing large Title 5 systems; however, there are no significant resources that will be impacted.

Existing and future lot sizes in this study area are generally suitable for Title 5 management provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.6 Study Area 6 – Overlook Road

The Overlook Road Study Area is located in the west-central portion of Westminster (Figure 4-1). It is a small study area encompassing approximately 384 acres and 49 lots, and is partially developed. The area is entirely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are greater than 1-acre, with an average lot size of approximately 7.8 acres. The area has potential for future subdivision of lots, at a greater development density than that which currently exists.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 6
Localized Problems
❑ Soil Type: Mostly till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow
Remote Problems
❑ Wetlands: Some large wetlands areas
Additional Considerations
❑ None

The area consists of mostly glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in adjacent Study Area 7 yielded a slower percolation rate than the range identified in the Board of Health database for this study area, but the observed groundwater depth was near the range identified in the database. A small portion of the area relies on private on-site wells for water supply. The area contains some wetlands. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems. A majority of the lot sizes are large. This partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Existing and future lot sizes in this study area are generally suitable for Title 5 management provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.7 Study Area 7 – Bacon Street

The Bacon Street Study Area is located in the central portion of Westminster, north of Route 2 (Figure 4-1). It is a small study area encompassing approximately 104 acres and 66 lots, and is mostly developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. A majority of the lots in the study area are less than 1-acre, but due to some very large lots, the average lot size is approximately 1.6 acres. The area has slight potential for future subdivision of lots, at a lesser development density than that which currently exists.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. However, supplemental data suggest the area experiences problems. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 7
Localized Problems
❑ Soil Type: All till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Lot sizes: Small to Medium ❑ Existing Development: Mostly developed
Remote Problems
❑ None
Additional Considerations
❑ Town Officials and Local Installer info: Suggests problems

The area consists of glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in Study Area 7 yielded a slower percolation rate than the range identified in the Board of Health database, but the observed groundwater depth was near the range identified in the database. Lot sizes are small to medium, and can be categorized as follows: approximately 1/5 of the lots are between 10,000 and 20,000 s.f. in size; approximately 1/3 of the lots are between 20,000 s.f. and 1-acre in size; and the remainder of the lots are

over 1-acre in size. The entire area has Town water. Visual surveys were conducted within the study area and confirm dense, older development on small lots, with moderate to steep slopes. Board of Health files were not reviewed for the area; however, the DPW Director and local system designers and installers did identify that the homes along Bacon Street and North Common Road experience problems due to the lot sizes, soil conditions, and groundwater depths in the area. Local installers added that system construction and repairs are more costly in these locations. Soil conditions may be the cause, as the subsurface investigation conducted in the area identified a silt soil horizon with very low permeability. The area contains the Westminster DPW facility at Oakmont Avenue.

Physical conditions in the study area may cause localized problems. Secondary physical characteristics including lot size and extent of development appear to have a greater impact on on-site systems than the criteria indicate. Lot sizes range from small to medium in this residential area; therefore, repairing and installing Title 5 systems most likely poses challenges such as requiring variances from regulations or necessitating expensive systems. The DPW facility consists of a large site with many uses including equipment storage, maintenance garages, and road salt storage. The facility currently utilizes an on-site system which is suspected to be impacting nearby resources.

Although the criteria do not indicate the area as a priority for overall wastewater need, it exhibits a localized need based on physical characteristics, information from local sources, and the DPW facility within the area. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.8 Study Area 8 – Turnpike-Willard Road

The Turnpike-Willard Road Study Area is located in the east-central portion of Westminster, near the town-boundary (Figure 4-1). It is a small study area encompassing approximately 274 acres and 113 lots, and is partially developed. The area is almost entirely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are greater than 1-acre, with an average lot size of approximately 2.4 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 8
Localized Problems
❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Part of area utilizes private wells ❑ Lot sizes: Small to Medium
Remote Problems
❑ Soil Type: Mix of till and sandy soils ❑ Percolation Rate: Generally rapid
Additional Considerations
❑ None

The area consists of a mix of glacial till soils and sand and gravel soils with varying percolation rates and miscellaneous limitations. The Board of Health database indicates that percolation rates are generally rapid to moderate (2 to 5 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). Approximately half of the area relies on private on-site wells for water supply. The area contains very little wetlands. Visual surveys were not conducted within the study area. The area was not

referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area do not indicate significant localized or remote problems. A majority of the lot sizes are large, but there is a significant amount between 20,000 s.f. and 1-acre in size, and some less than 20,000 s.f. in size. This partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Existing and future lot sizes in this study area are generally suitable for Title 5 management provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.9 Study Area 9 – Narrows Road Commercial

The Narrows Road Commercial Study Area is located in the east-central portion of Westminster, along the town-boundary (Figure 4-1). It is a small study area encompassing approximately 171 acres and 22 lots, and is partially developed. The area is mostly zoned commercial C-I, requiring a minimum lot size of 40,000 s.f. and partially zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Nearly all of the lots in the study area are greater than 1-acre, with an average lot size of approximately 7.8 acres. The area has potential for future subdivision of lots, at a greater development density than that which currently exists.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 9
Localized Problems
❑ Soil Type: Mix of till and sandy soils
Remote Problems
❑ None
Additional Considerations
❑ Mainly commercial zoned area

The area consists of a mix of glacial till soils and sand and gravel soils with varying percolation rates and miscellaneous limitations. The Board of Health database does not contain information for the area; however, information from adjacent areas indicates that percolation rates may be generally rapid to moderate (2 to 5 minutes per inch) and that groundwater depths may be shallow (4 to 6 feet). The entire area has Town water. The area contains few wetlands. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area do not indicate significant localized or remote problems. A majority of the lot sizes are large. Future commercial development may pose some challenges in installing large Title 5 systems; however, there are no significant resources that will be impacted.

Several commercial establishments are located in this area. Two of the establishments are identified in Chapter 2 as having the largest on-site systems in Town based on estimates. The BOH did not identify any known problems regarding these systems; however, they may become problematic in the future. Otherwise, existing and future lot sizes in this study area are generally suitable for Title 5 management

provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.10 Study Area 10 - Shady Avenue

The Shady Avenue Study Area covers the west-central portion of Westminster, along the town-boundary (Figure 4-1). It is a small study area encompassing approximately 376 acres and 163 lots, and is partially developed. The area is almost completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 2.3 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. However, supplemental data suggest the area experiences problems. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 10
Localized Problems
❑ Soil Type: Mix of till and sandy soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Very shallow ❑ Lot sizes: Many small lots
Remote Problems
❑ Surface Water: Greenwood Pond ❑ Wetlands: Some large wetland areas
Additional Considerations
❑ Local Designer and Installer info: Suggests isolated problems

The area consists of a mix of glacial till soils and sand and gravel soils with varying percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). There are many small lot sizes, which can be categorized as follows: approximately 1/3 of the lots are between 10,000 and 20,000 s.f. in size; over 1/5 of the lots are between 20,000 s.f. and 1-acre in size; and the remainder of the lots are over 1-acre in size. Most of the area is served by Town water. The area contains Greenwood Pond and some large wetlands. Visual surveys were not conducted within the study area. Board of Health files were not reviewed for the area; however, local system designers and installers did identify that the Holmes Park area experiences Title 5 failures and problems due to the lot sizes and groundwater depths in that area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Greenwood Pond was documented in a DEP Water Quality Assessment Report as impaired due to eutrophication; however, further study by DEP suggested that the high nutrient loading is naturally occurring. Secondary physical characteristics in the Holmes Park neighborhood, including lot size and extent of development appear to be causing system failures. All lots in this particular residential area are small and within glacial till soils; therefore, repairing and installing Title 5 systems most likely poses challenges such as requiring variances from regulations or necessitating expensive systems. Most of the area was included in the last phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The overall low assessment of need scored for the area is most likely driven by the conditions within the Holmes Park neighborhood. Existing and future lot sizes outside this area should minimize that need provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach for the overall study area; however, alternative wastewater management approaches should be explored for the Holmes Park neighborhood in the Wastewater Alternatives Analysis.

4.4.11 Study Area 11 – State Road West

The State Road West Study Area is located in the west-central portion of Westminster, near the town-boundary (Figure 4-1). It is a small study area encompassing approximately 213 acres and 57 lots, and is partially developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Just more than half of the lots in the study area are greater than 1-acre, with an average lot size of approximately 3.7 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. However, supplemental data suggest the area experiences problems. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 11
Localized Problems
❑ Soil Type: Nearly all till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Very shallow
Remote Problems
❑ Wetlands: Significant wetlands
Additional Considerations
❑ Town Health Agent info: Suggests isolated problems

The area consists of predominantly glacial till soils subject to slow percolation rates with some sand and gravel deposits. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). The entire area is served by Town water. The area contains significant wetlands throughout. Visual surveys were not conducted within the study area. Board of Health files were not reviewed for the area; however, the Health Agent did identify that the homes immediately west of Tophet Swamp experience problems due to groundwater depths in the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Groundwater depths appear to be an issue for the area. There are approximately 15 developed lots that are less than 30,000 s.f. in size. Remaining lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal. There are approximately 7 lots adjacent to Tophet Swamp along State Road West that are partially covered by wetlands. These lots experience high groundwater, according to the Health Agent. State Road West within the area was included in the last phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area scored a low assessment of need and existing and future lot sizes should support use of Title 5 management provided current zoning is not altered significantly. Therefore, Title 5 is an adequate

wastewater management approach for the overall study area; however, alternative wastewater management approaches should be explored for the homes immediately west of Tophet Swamp in the Wastewater Alternatives Analysis.

4.4.12 Study Area 12 - Burnt Millpond

The Burnt Millpond Study Area is located in the west-central portion of Westminster, near the town-boundary (Figure 4-1). It is a small study area encompassing approximately 205 acres and 29 lots, and is sparsely developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 7.1 acres. The area has significant potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 12
Localized Problems
❑ Soil Type: Mostly till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Very shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Surface Water: Burnt Millpond ❑ Wetlands: Some large wetland areas
Additional Considerations
❑ None

The area consists of mostly glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). The area relies entirely on private on-site wells for water supply. The area contains significant wetlands around Burnt Millpond. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Lot sizes are large and this sparsely developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal. The portion of Ellis Road within the area was included in the third phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

Existing and future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.13 Study Area 13 – Hager Park Road

The Hager Park Road Study Area is located in the central portion of Westminster, surrounding Meetinghouse Pond (Figure 4-1). It is a large study area encompassing approximately 1,219 acres and 215 lots, and is partially developed. The area is mostly zoned residential R-I, requiring a minimum lot

size of 50,000 square feet and partially zoned R-III, requiring a minimum lot size of 86,000 square feet for new development. A majority of the lots in the study area are greater than 1-acre, with an average lot size of approximately 5.7 acres. The area has potential for future subdivision of lots, at a lesser development density than that which currently exists.

The study area scored a **moderate** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 13
Localized Problems
❑ Soil Type: Nearly all till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Part of area utilizes private wells
Remote Problems
❑ Surface Water: Meetinghouse Pond ❑ Wetlands: Scattered wetlands in area
Additional Considerations
❑ Public water supply in area

The area consists of almost all glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in Study Area 13 yielded a percolation rate within the range identified in the Board of Health database, but the observed groundwater depth was deeper than the range identified in the database. Approximately half of the area relies on private on-site wells for water supply. The area contains Meetinghouse Pond, a large surface water body used as a drinking water resource for Fitchburg and Westminster and some wetlands. Nearly all of the Zone A and Zone B watershed protection areas for this resource are within the study area. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. There are some developed small to medium sized lots. Remaining lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal. A Town-owned parcel identified as a potential location for a senior affordable housing development by the Town Planner is located along the northern boundary of this study area. Upon further investigation, existing sewer can be extended approximately 600-feet to the parcel to serve the development; therefore, this does not constitute an overall wastewater management need in the study area.

Although the area scored a moderate assessment of need, the zoning south of Meetinghouse Pond requires very large lots. Therefore, future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems and degradation of nearby resources provided current zoning is not altered significantly. Also, Fitchburg owns a significant amount of land around the pond to protect it, and Westminster owns some land as well. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.14 Study Area 14 – Bakers Grove

The Bakers Grove Study Area is located in the east-central portion of Westminster, to the north of Wyman Pond (Figure 4-1). It also includes some nearby lots located adjacent to the area on the northwest shore of Wyman Pond. It is a very small study area encompassing approximately 53 acres and 40 lots, and is mostly developed. The area is almost completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. More than half of the lots in the study area are less than 1-acre, with an average lot size of approximately 1.3 acres. The area has little potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 14
Localized Problems
❑ Depth to Groundwater: Shallow ❑ Lot sizes: Small ❑ Existing Development: Mostly developed ❑ Presence of Private Wells: Part of area utilizes private wells
Remote Problems
❑ Soil Type: All sandy soils ❑ Percolation Rate: Generally very rapid ❑ Surface Water: Located adjacent to Wyman Pond
Additional Considerations
❑ BOH Files Review: Older systems

The area consists of sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally very rapid (less than 2 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The elevation difference between this area and surrounding surface water is small. Lot sizes are small, and can be categorized as follows: approximately ½ of the lots are between 10,000 and 20,000 s.f. in size; just under 1/6 of the lots are between 20,000 s.f. and 1-acre in size; and the remainder are over 1-acre in size. A significant portion of the area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm moderate to dense development on small lots, within close proximity to Wyman Pond. There is varying topography with some steep slopes. The overall area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for many of the streets in the area. The files indicated that there are older subsurface disposal systems in the area that utilize leach pits, which may need replacement upon inspection.

Physical conditions in the study area are likely to cause localized problems, and secondary physical characteristics such as lot size will exacerbate those problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Wyman Pond. Wyman Pond was documented in a report by Anderson-Nichols as experiencing eutrophication, with the most likely nutrient source coming from dense development and on-site systems. Groundwater depths are likely an issue for lots nearest to the pond. Many lot sizes are small in this residential area; therefore, repairing and installing Title 5 systems most likely requires several variances. Since the portion of the area near the pond uses private wells, siting systems will be even more challenging. There are two campgrounds located in the southern portion of the area, on Wyman Pond. The campgrounds have clusters of small cabins within close proximity to the pond. BOH files indicate they rely on older, individual subsurface

disposal systems with leach pits. The area was included in the second phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based mainly on the need for resource protection with some physical limitations. The greatest localized and remote need is prevalent in the camp sites. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.15 Study Area 15 – East Wyman

The East Wyman Study Area is located in the east-central portion of Westminster, to the northeast of Wyman Pond (Figure 4-1). It also includes some nearby lots located adjacent to the area on the northeast shore of Wyman Pond. It is a very small study area encompassing approximately 82 acres and 70 lots, and is mostly developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are less than 1-acre, with an average lot size of approximately 1.2 acres. The area has little potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 15
Localized Problems
❑ Depth to Groundwater: Moderate ❑ Lot sizes: Small ❑ Existing Development: Mostly developed ❑ Presence of Private Wells: Part of area utilizes private wells
Remote Problems
❑ Soil Type: Mostly sandy soils ❑ Percolation Rate: Generally very rapid ❑ Surface Water: Located adjacent to Wyman Pond
Additional Considerations
❑ BOH Files Review: Older systems, variances

The area consists of sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally very rapid (less than 2 minutes per inch) and indicate that groundwater depths are typically moderate (greater than 6 feet). Lot sizes are small, and can be categorized as follows: just under ½ of the lots are less than 20,000 s.f. in size; just over ¼ of the lots are between 20,000 s.f. and 1-acre in size; and the remainder are over 1-acre in size. A significant portion of the area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm moderate to dense development on small lots, within close proximity to Wyman Pond. The overall area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for many of the streets in the area. The files indicated that there are older subsurface disposal systems in the area that utilize leach pits, which may need replacement upon inspection. Variances for system upgrades were also noted in the northwest portion of the area. There are also newer, upgraded systems that require pumps.

Physical conditions in the study area are likely to cause localized problems, and secondary physical characteristics such as lot size will exacerbate those problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Wyman Pond. Wyman Pond was

documented in a report by Anderson-Nichols as experiencing eutrophication, with the most likely nutrient source coming from dense development and on-site systems. Many lot sizes are small in this residential area; therefore, repairing and installing Title 5 systems most likely requires several variances. Since the portion of the area near the pond uses private wells, siting systems will be even more challenging. The area was included in the second phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based mainly on the need for resource protection with some physical limitations. The greatest localized and remote need is prevalent in the northwest portion of the study area, where smaller lots are located. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.16 Study Area 16 - Notown Road Residential

The Notown Road Residential Study Area is located in the eastern portion of Westminster, near the town-boundary (Figure 4-1). It is a small study area encompassing approximately 98 acres and 23 lots, and is partially developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Virtually all of the lots in the study area are greater than 1-acre, with an average lot size of approximately 4.3 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 16
Localized Problems
❑ Soil Type: Mostly till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Surface Water: Rice Meadow
Additional Considerations
❑ None

The area consists of mostly glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The area relies entirely on private on-site wells for water supply. The area contains a significant surface water body referred to as Rice Meadow. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Existing and future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.17 Study Area 17 - Eastern Westminster

The Eastern Westminster Study Area is located in the eastern portion of Westminster, near the town-boundary (Figure 4-1). It is a small study area encompassing approximately 353 acres and 14 lots, and is partially developed. The area is mostly zoned residential R-II, requiring a minimum lot size of 60,000 square feet for new development and partially zoned industrial I-II, requiring a minimum lot size of 40,000 square feet for new development. Virtually all of the lots in the study area are greater than 1-acre, with an average lot size of approximately 25.2 acres. The area has significant potential for future subdivision of lots, at a greater development density than that which currently exists.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. However, the zoning classification suggests additional evaluation may be warranted. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 17
Localized Problems
❑ Soil Type: Mix of till and sandy soils ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Surface Water: Sawmill Pond ❑ Wetlands: Scattered wetlands in area
Additional Considerations
❑ Partially industrial zoned area ❑ Fitchburg/Westminster Landfill

The area consists of a mix of glacial till soils and sand and gravel soils with varying percolation rates and miscellaneous limitations. The Board of Health database does not contain information for the study area or adjacent areas. Portions of the area not adjacent to Fitchburg rely entirely on private on-site wells for water supply. The area contains a significant portion of Sawmill Pond, Flag Brook, and some large wetlands areas. Sawmill Pond is a water supply source for Custom Papers Group. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area. The Westminster/Fitchburg Landfill is located within this study area. This landfill is currently sewered directly by Fitchburg. It has significant capacity remaining, and will most likely remain in operation throughout the planning period of this report.

Physical conditions in the study area are mixed, and environmental resources are present. Lot sizes in the area are large; however, installing Title 5 systems for industrial uses will pose challenges. Wastewater loads from future industrial development in the area can cause negative impacts to nearby environmental resources as well.

Future industrial development has the potential for significant impacts to the area and the nearby resources. Although the area scored a very low assessment of need, the current zoning classification warrants special attention. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.18 Study Area 18 – Ellis-Newton

The Ellis-Newton Study Area is located in the southwest portion of Westminster, adjacent to the town-boundary (Figure 4-1). It is a very large study area encompassing approximately 2,023 acres and 331

lots, and is partially developed. The area is almost entirely zoned residential R-II, requiring a minimum lot size of 60,000 square feet for new development. Most of the lots in the study area are greater than 1-acre, with an average lot size of approximately 6.1 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 18
Localized Problems
❑ Soil Type: Mix of till and sandy soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Surface Water: Several water bodies in area ❑ Wetlands: Scattered wetlands in area ❑ Proximity to Vernal Pools: Vernal pools identified in area
Additional Considerations
❑ None

The area consists of a mix of glacial till soils and sand and gravel soils with varying percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in Study Area 18 yielded a more rapid percolation rate than the range identified in the Board of Health database, and the observed groundwater depth was deeper than the range identified in the database. The entire area relies on private on-site wells for water supply. The area contains Upper Reservoir, Minott Pond, and a portion of Wrights Reservoir. There are significant wetlands throughout the study area. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. Minott Pond and Wrights Reservoir were identified in a MA-DEP Water Quality Assessment Report as impaired from eutrophication. Further study suggested that only Minott Pond experiences excessive nutrient loading. Upper Reservoir was listed with the state as an impaired water body due to suspected atmospheric deposition of mercury. There are some developed medium-sized lots. Remaining lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal. Also, percolation rates and groundwater depths may be less restrictive than the Board of Health database indicates based on the results of the subsurface investigation performed in the study area.

The overall wastewater need of the area is driven by the needs of nearby water resources. Previous research by DEP suggests that improved land management is an appropriate means of surface water remediation, as opposed to improved wastewater management. Although the area scored a high overall assessment of need, the zoning requires very large lots. Future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.19 Study Area 19 – Lake Drive West

The Lake Drive West Study Area is located in the west-central portion of Westminster, to the west of Partridge Pond (Figure 4-1). It is a very small study area encompassing approximately 62 acres and 49 lots, and is almost entirely developed. The area is mostly zoned residential R-I, requiring a minimum lot size of 50,000 square feet and partially zoned R-II, requiring a minimum lot size of 60,000 square feet for new development. Most of the lots in the study area are less than 1-acre, with an average lot size of approximately 1.3 acres. The area has little potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 19
Localized Problems
❑ Depth to Groundwater: Moderate ❑ Lot sizes: Small ❑ Existing Development: Mostly developed ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Soil Type: Mostly sandy soils ❑ Percolation Rate: Generally rapid ❑ Surface Water: Located adjacent to Partridge Pond
Additional Considerations
❑ BOH Files Review: Older systems, upgrades ❑ Local Installer Info: Confirms problems

The area consists of sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid (2 to 5 minutes per inch) and indicate that groundwater depths are typically moderate (greater than 6 feet). Lot sizes are small, and can be categorized as follows: just over 1/3 of the lots are less than 20,000 s.f. in size; just over 1/5 of the lots are between 20,000 s.f. and 1-acre in size; and the remainder are over 1-acre in size. There are also a few lots less than 10,000 s.f. in size. The entire area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm moderate to dense development on small lots, within close proximity to Partridge Pond. The topography of the study area is steep, sloping towards the pond and ledge outcrops and boulders were observed. The overall area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for the streets in the area. The files indicated that there are older subsurface disposal systems in the area that utilize leach pits, which may need replacement upon inspection. There are also newer, upgraded systems that require unique construction. Local system designers and installers confirm that this area is difficult, but not as burdensome as conditions on Lake Drive East.

Secondary characteristics of the study area, such as lot size and development density are likely to cause localized problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Partridge Pond. Many small lots in this residential area are located on the waterfront; therefore, repairing and installing Title 5 systems most likely requires several variances. Since the area uses private wells, siting systems will be even more challenging. The northern portion of the area was included in the third phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based on physical characteristics and resources. The greatest localized and remote need is prevalent in the eastern side of Lake Drive West, where smaller lots and the pond are located. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.20 Study Area 20 – Lake Drive East

The Lake Drive East Study Area is located in the west-central portion of Westminster, to the east of Partridge Pond (Figure 4-1). It is a very small study area encompassing approximately 12 acres and 52 lots, and is entirely developed. The area is almost completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Almost all of the lots in the study area are less than 1-acre, with an average lot size of approximately 9,700 s.f. The area has no potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 20
Localized Problems
❑ Depth to Groundwater: Moderate ❑ Lot sizes: Very small ❑ Existing Development: Entirely developed ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Soil Type: Mix of sandy soils and floodplain alluvium ❑ Percolation Rate: Generally rapid ❑ Surface Water: Located adjacent to Partridge Pond
Additional Considerations
❑ BOH Files Review: Tight tanks and recent inspection failures ❑ Local Installer info: Confirms problems

The area consists of sand and gravel soils and floodplain soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid (2 to 5 minutes per inch) and indicate that groundwater depths are typically moderate (greater than 6 feet). The subsurface investigation conducted in Study Area 20 yielded a percolation rate within the range identified in the Board of Health database, and the observed groundwater depth was within the range identified in the database. Lot sizes are very small, and can be categorized as follows: nearly ¾ of the lots are less than 10,000 s.f. in size and approximately 1/5 of the lots are between 10,000 and 20,000 s.f. in size. The entire area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm dense development on very small lots, within close proximity to Partridge Pond. The topography of the study area is very steep, sloping towards the pond and some ledge outcrops were observed. The overall area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for Lake Drive East. The files indicated that there are two tight tanks and a recent inspection failure. Local system designers and installers confirm that this area ranks amongst the most problematic in Town for the stated reasons.

Secondary characteristics of the study area, such as lot size and development density are likely to cause localized problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Partridge Pond. Many small lots in this residential area are located on the waterfront

with extreme slopes; therefore, repairing and installing Title 5 systems most likely requires several variances, if at all possible. Since the area uses private wells, siting systems will be even more challenging. Some lots in the area rely on tight tanks for wastewater management, a practice likely to increase as systems fail inspection. The area was included in the third phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based on physical characteristics and resources. Discussions with Town officials, local designers, and local installers indicate the study area is even more problematic than criteria indicate. BOH files confirm this indication. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.21 Study Area 21 – Edro Isle

The Edro Isle Study Area is located in the southern portion of Westminster, on the western side of Wyman Pond (Figure 4-1). It is a small study area encompassing approximately 100 acres and 112 lots, and is mostly developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are less than 1-acre, with an average lot size of approximately 39,000 s.f. The area has little potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 21
Localized Problems
❑ Depth to Groundwater: Very shallow ❑ Lot sizes: Very small ❑ Existing Development: Mostly developed ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Soil Type: Mostly sandy soils ❑ Percolation Rate: Generally rapid ❑ Surface Water: Located adjacent to Wyman Pond
Additional Considerations
❑ BOH Files Review: Tight tanks, recent inspection failures, and variances ❑ Local Installer Info: Confirms problems

The area consists of mainly sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid to moderate (2 to 5 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). The subsurface investigation conducted in Study Area 21 indicated groundwater depth was within the range identified in the Board of Health database. The elevation difference between portions of this area and surrounding surface water is small. Lot sizes are very small, and can be categorized as follows: just under 1/6 of the lots are less than 10,000 s.f. in size; just under ½ of the lots are between 10,000 and 20,000 s.f. in size; approximately 1/5 of the lots are between 20,000 and 1-acre in size; and the remainder are over 1-acre in size. The entire area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm dense development on small lots, within close proximity to Wyman Pond. The topography in some areas is steep, sloping towards the pond. The area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for many of the streets in the area. The files indicated that there is one tight tank, four recent system inspection failures, and variances necessary to upgrade systems in the area. Groundwater depths at less than 4-feet were noted on Edro Isle

Road. Local system designers and installers confirm that this area ranks amongst the most problematic in Town for the stated reasons.

Physical conditions in the study area are likely to cause localized problems, and secondary physical characteristics such as lot size will exacerbate those problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Wyman Pond. Wyman Pond was documented in a report by Anderson-Nichols as experiencing eutrophication, with the most likely nutrient source coming from dense development and on-site systems. Groundwater depths and steep slopes are likely an issue for the area. Lot sizes are very small in this residential area; therefore, repairing and installing Title 5 systems most likely requires several variances. Since the area uses private wells, siting systems will be even more challenging. A lot in the area relies on a tight tank for wastewater management, a practice likely to increase as systems fail inspection. The portion of the area referred to as Edro Isle was included in the second phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based on physical characteristics and resources. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.22 Study Area 22 – Lakewood Park

The Lakewood Park Study Area is located in the eastern portion of Westminster, and consists of a small peninsula in the north part of Wyman Pond (Figure 4-1). It is a very small study area encompassing approximately 31 acres and 98 lots, and is entirely developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Nearly all of the lots in the study area are less than 1-acre, with an average lot size of approximately 14,000 s.f. The area has no potential for future subdivision of lots.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 22
Localized Problems
❑ Lot sizes: Very small ❑ Existing Development: Completely developed ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Soil Type: Nearly all sandy soils ❑ Percolation Rate: Generally rapid ❑ Surface Water: Located adjacent to Wyman Pond
Additional Considerations
❑ BOH Files Review: Tight tanks, recent inspection failures, and variances ❑ Local Installer Info: Confirms problems

The area consists of sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid to moderate (2 to 5 minutes per inch). There is no available information concerning groundwater depth; however, information from adjacent areas indicates groundwater depths may be less than 6 feet. The elevation difference between this area and surrounding surface water is small. Lot sizes are very small, and can be categorized as follows:

approximately ¼ of the lots are less than 5,000 s.f. in size; just over ¼ of the lots are between 5,000 and 10,000 s.f. in size; and just under ¼ of the lots are between 10,000 and 20,000 s.f. in size. The entire area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm dense development on small lots, within close proximity to Wyman Pond. The area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for many of the streets in the area. The files indicated that there are four tight tanks, two recent system inspection failures, and variances necessary to upgrade systems in the area. Elevated nitrate levels, below the Maximum Contaminant Level (MCL), were also noted in two private wells. Local system designers and installers confirm that this area ranks amongst the most problematic in Town for the stated reasons.

Physical conditions in the study area are likely to cause localized problems, and secondary physical characteristics such as lot size will exacerbate those problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Wyman Pond and potentially to private wells. Wyman Pond was documented in a report by Anderson-Nichols as experiencing eutrophication, with the most likely nutrient source coming from dense development and on-site systems. Groundwater depths are likely an issue for the area. Lot sizes are very small in this residential area; therefore, repairing and installing Title 5 systems most likely requires several variances, if at all possible. Since the area uses private wells, siting systems will be even more challenging. Several lots in the area rely on tight tanks for wastewater management, a practice likely to increase as systems fail inspection. The area was included in the second phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based on physical characteristics and resources. Therefore, alternative wastewater management approaches should be explored for this study area in the Wastewater Alternatives Analysis.

4.4.23 Study Area 23 – Leino Park

The Leino Park Study Area is located in the southern portion of Westminster, on the western side of Wyman Pond (Figure 4-1). It is a small study area encompassing approximately 181 acres and 124 lots, and is partially developed. The area is completely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are less than 1-acre, with an average lot size of approximately 1.5 acres.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 23
Localized Problems
❑ Depth to Groundwater: Shallow ❑ Lot sizes: Very small ❑ Presence of Private Wells: Most of area utilizes private wells
Remote Problems
❑ Soil Type: Nearly all sandy soils ❑ Percolation Rate: Generally rapid ❑ Surface Water: Located adjacent to Wyman Pond
Additional Considerations
❑ BOH Files Review: Tight tanks, recent inspection failures, and variances ❑ Local Installer Info: Confirms problems ❑ Potential Municipal Groundwater Well Site

The area consists of sand and gravel soils subject to rapid percolation rates. The Board of Health database confirms that percolation rates are generally rapid to moderate (2 to 5 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The subsurface investigation conducted in adjacent Study Area 21 indicated groundwater depth was shallower than the range identified in the Board of Health database for this study area. The elevation difference between portions of this area and surrounding surface water is small. Lot sizes are very small, and can be categorized as follows: just over ¼ of the lots are less than 5,000 s.f. in size; just over ¼ of the lots are between 5,000 and 10,000 s.f. in size; just under 1/6 of the lots are between 10,000 and 20,000 s.f. in size; and the remaining lots are over 20,000 s.f. in size. A private water district serves streets in the northeastern portion of the area. The remainder of the area relies on private on-site wells for water supply. Visual surveys were conducted within the study area and confirm dense development on small lots, within close proximity to Wyman Pond. The topography in some areas is very steep, sloping towards the pond. The area was referenced as a problem area with respect to other areas in Town; therefore, Board of Health files were reviewed for many of the streets in the area. The files indicated that there are eight tight tanks, three recent system inspection failures, and variances necessary to upgrade systems in the area. Groundwater depths at less than 4-feet were noted on Old Oak Avenue. Local system designers and installers confirm that this area is the most problematic in Town for the stated reasons.

Physical conditions in the study area are likely to cause localized problems, and secondary physical characteristics such as lot size will exacerbate those problems. Although the soil conditions in the area may prevent some problems by allowing system effluent to percolate rapidly into the ground, this condition contributes to a remote problem in the contamination of Wyman Pond. Wyman Pond was documented in a report by Anderson-Nichols as experiencing eutrophication, with the most likely nutrient source coming from dense development and on-site systems. Groundwater depths are likely an issue for portions of the area. Lot sizes are very small in this residential area; therefore, repairing and installing Title 5 systems most likely requires several variances, if at all possible. Siting systems will be even more challenging in portions of the area that rely on private wells. Many lots in the area rely on tight tanks for wastewater management, a practice likely to increase as systems fail inspection. Conversations with local system designers and installers indicate that there are more tight tanks than identified from files review. The portion of the area referred to as Leino Park was included in the second phase of a recommended prioritized sewer program presented in a town-wide wastewater report prepared by S E A in 1975.

The area exhibits a high overall need based on physical characteristics and resources. Discussions with Town officials, local designers, and local installers indicate that the portion of the study area referred to as Leino Park is even more problematic than criteria indicate, and the most challenging in Town. The

western and southern portions of the area are sparsely developed and lot sizes are large, which has reduced the overall criteria rating some. The center of the study area consists of two large Town-owned parcels that encompass a potential municipal groundwater well site. Protection of this area is an important consideration based on the Town's potential future water supply needs. Therefore, alternative wastewater management approaches should be explored for the central and eastern portions of this study area in the Wastewater Alternatives Analysis.

4.4.24 Study Area 24 – East Road Residential

The East Road Residential Study Area is located in the southeast portion of Westminster, along the town-boundary (Figure 4-1). It is a small study area encompassing approximately 179 acres and 21 lots, and is sparsely developed. The area is entirely zoned residential R-I, requiring a minimum lot size of 50,000 square feet for new development. Most of the lots in the study area are greater than 1-acre, with an average lot size of approximately 8.5 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **very low** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 24
Localized Problems
❑ Soil Type: Mostly till soils ❑ Depth to Groundwater: Shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Percolation Rate: Generally rapid ❑ Wetlands: Large wetlands in area
Additional Considerations
❑ None

The area consists of mostly glacial till soils with varying percolation rates and miscellaneous limitations. The Board of Health database indicates that percolation rates are generally rapid to moderate (2 to 5 minutes per inch) and indicate that groundwater depths are typically shallow (4 to 6 feet). The entire area relies on private on-site wells for water supply. The area contains a large region of wetlands in the northeast corner. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area do not indicate significant localized or remote problems. A majority of the lot sizes are large, but approximately 1/3 are between 20,000 s.f. and 1-acre in size. This sparsely developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal.

Existing and future lot sizes in this study area are generally suitable for Title 5 management provided current zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.4.25 Study Area 25 – South Westminster

The South Westminster Study Area covers the southern portion of Westminster (Figure 4-1). It is a very large study area encompassing approximately 3,012 acres and 254 lots, and is partially developed. The area is almost entirely zoned residential R-III, requiring a minimum lot size of 86,000 square feet for new development. Most of the lots in the study area are greater than 1-acre, with an average lot size of approximately 11.9 acres. The area has potential for future subdivision of lots, but at a continued moderate development density.

The study area scored a **high** preliminary assessment of overall wastewater need based on the criteria. The following table summarizes key factors for this particular area used to rate the criteria.

Summary of Needs Considerations

Study Area 25
Localized Problems
❑ Soil Type: Nearly all till soils ❑ Percolation Rate: Generally slow ❑ Depth to Groundwater: Very shallow ❑ Presence of Private Wells: Entire area utilizes private wells
Remote Problems
❑ Surface Water: Mare Meadow Reservoir ❑ Wetlands: Scattered wetlands in area ❑ Proximity to Vernal Pools: Vernal pools identified in area
Additional Considerations
❑ Public water supply in area

The area consists of predominantly glacial till soils subject to slow percolation rates. The Board of Health database confirms that percolation rates are generally slow (6 to 24 minutes per inch) and indicate that groundwater depths are typically very shallow (2 to 4 feet). The subsurface investigation conducted in adjacent Study Area 13 yielded a percolation rate within the range identified in the Board of Health database for this study area, but the observed groundwater depth was much deeper than the range identified in the database. The entire area relies on private on-site wells for water supply. The area contains most of Mare Meadow Reservoir, a large surface water body used as a drinking water resource for Fitchburg and Westminster and some wetlands. Nearly all of the Zone A and Zone B watershed protection areas for this resource are within the study area. Noyes Pond, a tributary to Mare Meadow Reservoir, is also located in the area. Visual surveys were not conducted within the study area. The area was not referenced as a problem area with respect to other areas in Town; therefore, specific Board of Health files were not reviewed for the area.

Physical conditions in the study area may cause localized problems, and environmental resources are present. There are some developed medium sized lots. Remaining lot sizes are large and this partially developed area is zoned residential; therefore, installing Title 5 systems should be generally feasible and impacts to the resources from development should be minimal. Also, groundwater depths for certain areas may not be as shallow as the Board of Health database indicates based on the results of the subsurface investigation in nearby Study Area 13.

Although the area scored a high assessment of overall need, the rating is driven primarily by the needs of nearby water resources. Fitchburg owns a significant amount of land surrounding the reservoir for protection. Also, the zoning requires very large lots. Future lot sizes in this study area minimize physical constraints on siting subsurface disposal systems and degradation of nearby resources provided current

zoning is not altered significantly. Therefore, Title 5 is an adequate wastewater management approach; consequently, no further study of this area is warranted.

4.5 Needs Assessment Summary

There are a total of 12 study areas determined to possibly need alternative wastewater management and a total of 13 study areas that were determined to be suitable for on-site wastewater disposal under Title 5 management. These needs areas are illustrated in Figure 4-3 (attached at the end of this report) and are listed in Table 4.1 located below. Table 4.1 also summarizes the likely nature of problems with on-site systems based on the data analyzed. As detailed at the beginning of this chapter, localized problems occur where system effluent cannot percolate into the ground and can cause nuisance or public health problems for the homeowners in that location, and remote problems occur where geologic conditions do not adequately filter system effluent prior to contact with environmental resources such as surface water. Finally, Table 4.1 provides the preliminary assessment word score describing the severity of that problem based on the scoring criteria in Appendix C.

Table 4.1
Wastewater Needs Assessment

Area	Area Name	Needs Assessment	Likely Nature of Problems	Preliminary Assessment
1	North Westminster	Title 5	Localized	Low
2	Ashburnham Road	Title 5	Remote	Moderate
3	**State Road East Industrial**	**Needs Area**	**Mixed**	**Low**
4	Town Farm Road	Title 5	Localized with Remote	Moderate
5	Route 140 Commercial	Title 5	Localized	Very Low
6	Overlook Road	Title 5	Localized	Very Low
7	**Bacon Street**	**Needs Area**	**Localized**	**Very Low**
8	Turnpike-Willard Road	Title 5	Mixed	Very Low
9	Narrows Road Commercial	Title 5	Localized	Very Low
10	**Shady Avenue**	**Isolated Needs Area**	**Localized with Remote**	**Low**
11	**State Road West**	**Isolated Needs Area**	**Mixed**	**Low**
12	Burnt Millpond	Title 5	Localized	Low
13	Hager Park Road	Title 5	Mixed	Moderate
14	**Bakers Grove**	**Needs Area**	**Mixed**	**High**
15	**East Wyman**	**Needs Area**	**Mixed**	**High**
16	Notown Road Residential	Title 5	Localized	Low
17	**Eastern Westminster**	**Needs Area**	**Mixed**	**Very Low**
18	Ellis-Newton	Title 5	Mixed	High
19	**Lake Drive West**	**Needs Area**	**Mixed**	**High**
20	**Lake Drive East**	**Needs Area**	**Mixed**	**High**
21	**Edro Isle**	**Needs Area**	**Mixed**	**High**
22	**Lakewood Park**	**Needs Area**	**Mixed**	**High**
23	**Leino Park**	**Isolated Needs Area**	**Mixed**	**High**
24	East Road Residential	Title 5	Mixed	Very Low
25	South Westminster	Title 5	Mixed	High

The results of the needs assessment are based on the methodology outlined in Section 4.3, input provided by the Citizens Advisory Committee and the Technical Advisory Group for the CWMP, and the results of a public Wastewater Needs Workshop conducted during the needs analysis phase of the CWMP. More than half of the study areas identified as needs areas in the table scored high preliminary assessments based on the criteria. The needs areas with lower assessments consist of study areas that are zoned for future industrial use and study areas where supplemental data indicates problems with on-site wastewater management. Conversely, there are two study areas identified as Title 5 areas that scored high ratings based on the criteria. These study areas scored high ratings mainly due to potential remote needs; however, certain factors including current lot sizes and zoning minimize those needs.

The needs areas can be prioritized using the results of the needs assessment to develop preliminary needs rankings. The scoring criteria used to yield preliminary assessments can serve as an initial indication of priority. The needs areas surrounding Wyman Pond and Partridge Pond appear to display the greatest wastewater need (Needs Areas 14, 15, 19-23) based on the preliminary assessments. The Shady Avenue and State Road West isolated needs areas appear to have the next greatest need (Needs Areas 10-11). The

remaining needs areas are the Bacon Street area and the two areas zoned for future industrial use (Needs Areas 7, 3, and 17, respectively).

The supplemental data utilized to arrive at final wastewater needs assessment serve to refine priority of need. Sources indicate that Leino Park – Needs Area 23 and Lakewood Park – Needs Area 22 have the greatest wastewater need in Town. Lake Drive East – Needs Area 20, located on Partridge Pond, also has a significant wastewater need. The following three areas appear to be the highest priority in Town:

Area No.	Needs Area
23	Leino Park
22	Lakewood Park
20	Lake Drive East

Based on the supplemental data, Edro Isle – Needs Area 21 and Bakers Grove – Needs Area 14 have similar characteristics and wastewater concerns as the areas around Wyman Pond previously described. However, the priority of these areas does not appear to be as high. Similarly, Lake Drive West – Needs Area 19, located on Partridge Pond, has similar characteristics and wastewater concerns as the Lake Drive East area, but the priority does not appear as high. Therefore, the following three areas appear to be the second highest priority in Town:

Area No.	Needs Area
21	Edro Isle
14	Bakers Grove
19	Lake Drive West

East Wyman – Needs Area 15 is the remaining area around Wyman Pond assessed as having a wastewater need. Sources indicate that the isolated needs areas, Shady Avenue and State Road West, have a significant wastewater need that should be considered a priority subsequent to the Wyman Pond and Partridge Pond areas. Therefore, the following three areas appear to be the third highest priority in Town:

Area No.	Needs Area
15	East Wyman
10	Shady Avenue
11	State Road West

The remaining Needs Areas are: Bacon Street - Needs Area 7, State Road East Industrial – Needs Area 3, and Eastern Westminster – Needs Area 17. These areas appear to exhibit a lesser wastewater need and consequently, have the lowest priority.

4.6 Future Wastewater Conditions

Future wastewater conditions relating to the municipal sewer system were initially assessed in the *Municipal Wastewater System Capacity Analysis* (Capacity Analysis), prepared by S E A for the Town in August 2004 (attached as Appendix A to this report). The analysis estimates existing and future sewer flows in Town to determine the remaining capacity of the sewer system, and is summarized in Chapter 2 of the report. Recent information pertaining to additional sewer users has been acquired from the Town and is included in this section of the chapter for analysis. This section also notes that future wastewater conditions in Town will be affected by the conclusions of the Wastewater Alternatives Analysis and Town plans for public development. These future wastewater needs must be evaluated prior to making recommendations for the municipal sewer system.

The Capacity Analysis focused on the Whitman River Pump Station, as it was determined to be the greatest limitation in the municipal sewer system. Existing peak wastewater flow was estimated in the Capacity Analysis to compare with the pump capacity of the pump station. The analysis identifies this estimated peak flow in 2004 to be approximately 654,000 gallons per day (gpd). This can be converted to a flow rate of approximately 454 gallons per minute (gpm). The pump station capacity was measured in the analysis to be approximately 500 gpm. Therefore, there was approximately 46 gpm or 66,000 gpd of remaining peak flow capacity available at the pump station at the time of the analysis. Using the methodology in the Capacity Analysis, the remaining peak flow capacity can be adjusted to average daily flow capacity. This flow rate equals approximately 12,700 gpd (8.8 gpm). Therefore, at the time of the analysis this amount was the remaining capacity of the sewer system, on an average daily basis.

Since the Capacity Analysis was completed, residences in Town have continued to connect to the sewer system in areas that were sewered more recently, further reducing remaining pump station capacity. This was anticipated during the Capacity Analysis; therefore, it included an estimate of future wastewater flow from sewered areas with properties not yet connected to the sewer system. The analysis also estimated future wastewater flow from future sewered areas and infiltration and inflow (I/I) from future development.

Properties in Town with access to the existing municipal sewer system that are entitled to connect but have not done so are referred to as "potential sewer users" since the Town has an obligation to provide them with municipal wastewater service. One user is Simplex Time Recorder Co., which has the right to increase current allowable wastewater discharges to the municipal sewer system by 50,000 gpd at any point in the future, based on an existing agreement with the Town. The other potential users include residential, commercial, and municipal properties that may contribute an additional 46,200 gpd of future flow to the sewer system on an average daily basis, based on the Capacity Analysis. This analysis assumes that properties in Town that have previously been assessed betterments for municipal sewer service have the right to connect to the sewer system in perpetuity, based on conversations with the Town (i.e. betterment provisions do not incorporate a sunset clause).

The future sewered area included in the Capacity Analysis is referred to as The Village at Old Mill. Construction is now nearing completion and residents began moving into the development in fall 2005. The average daily wastewater flow from the entire development was estimated to be approximately 17,490 gpd by BSC Group Inc. in a previous evaluation. The I/I that will occur within new sewers installed to serve this development was estimated to be approximately 1,401 gpd by Earth Tech.

Subsequent to the Capacity Analysis, the DPW Director identified a new sewer extension from Narrows Road that Fitchburg is planning to construct. This sewer extension is part of an agreement between Fitchburg and Westminster to allow another sewer to be installed along Narrows Road to serve the Regional Water Filtration Facility on Hager Park Road. The sewer serving the treatment plant will be connected to the Fitchburg sewer system and the extension from Narrows Road will be connected to the Westminster sewer system. The construction is expected to begin in 2005 and the extension will serve several commercial establishments along Village Inn Road. The Wachusett Village Inn, a service station referred to as Mr. Mike's, and Village Realty Trust are located along this road. Earth Tech prepared the sewer design for Fitchburg and estimated the wastewater flow to the Westminster sewer system from the extension. The estimated flow for this future sewered area is approximately 20,900 gpd based on Title 5 flow guidelines. Potential I/I occurring in this sewer extension is not addressed at this time because it is expected that the extension will be a low pressure sewer system.

The Town instituted a sewer moratorium at the time of the Capacity Analysis to sustain the capacity of the sewer system until alternatives for wastewater management can be fully evaluated in this report. The

moratorium prevents future extensions of the sewer system to previously unsewered areas; however, the future sewered areas including The Village at Old Mill and the Narrows Road extension were approved prior to the moratorium. The estimated average daily wastewater flow from potential sewer users in currently sewered areas totals 96,200 gpd. The estimated average daily wastewater flow from future sewered areas totals 38,400 gpd. The total future wastewater flow to the sewer system is estimated to be approximately 134,600 gpd on an average basis. Table 4.2 provides an analysis of peak future wastewater flow using the methodology from the Capacity Analysis. Including future I/I, this yields an estimated peak flow rate of approximately 701,321 gpd or 487 gpm.

Table 4.2
Future Wastewater Flow with Sewer Moratorium

Flow from Currently Sewered Areas	96,200 gpd
Flow from Future Sewered Areas	38,400 gpd
Total Future Average Daily Flow	134,600 gpd
Peaking Factor from TR-16	5.2
Future Peak Hourly Wastewater Flow	699,920 gpd
Infiltration and Inflow	1,401 gpd
Future Peak Hourly Wastewater Flow with I/I	**701,321 gpd**
Future Peak Flow Converted to Gallons per Minute	**487 gpm**

The peak flow rate of this additional future flow exceeds the capacity of the Whitman River Pump Station, as estimated in August 2004, by approximately 441 gpm. The maximum capacity of the Fitchburg interceptor was estimated by Earth Tech to be approximately 760 gpm in a previous evaluation. The interceptor sewer transports wastewater pumped from the Whitman River Pump Station into Fitchburg. Therefore, future wastewater flow will eventually exceed the capacity of the interceptor sewer also.

In addition to future users identified herein, the recommendations of the Wastewater Alternatives Analysis may include some extent of proposed sewering to serve areas identified as in need of improved wastewater management within this chapter. The potential wastewater flow contribution of these areas must also be considered when making recommendations regarding the municipal sewer system.

Finally, existing plans for public development and/or affordable housing will impact future wastewater conditions. According to the Town Planner, Westminster has begun development of a production plan through Executive Order 418, which allows Massachusetts municipalities to plan for affordable housing. The planner identified two Town-owned parcels under consideration for senior affordable housing developments. The parcels are of considerable size and have access to the municipal sewer system. One parcel is located at 69 West Main Street, and could possibly support two development complexes of comparable size and nature to the existing "Wellington" housing development in Town. The "Wellington" housing development is 35 units, according to the Town Planner. The other parcel, located off Meetinghouse Road, is not as large and contains some wetlands. Preliminary discussions have suggested a less dense, duplex development at this location. The planner indicated that the Town is researching other parcels for family affordable housing. There are also other preliminary plans for public development that can have an impact on wastewater management in Town including the "satellite village" concept recommended in the Draft Master Plan and mixed use development in the Town center.

4.6.1 Conclusions

The Town sewer system is currently exhibiting a need for increased capacity to serve existing sewered areas and future areas that are connecting to the system. Additional planned public development and potential recommended sewering from this report will add to that need. Options for increasing capacity will be explored once the Wastewater Alternatives Analysis phase of the CWMP is complete.

The summary in Chapter 2 of this report regarding existing infiltration and inflow (I/I) occurring in the sewer system does not indicate significant problems. However, conversations with the DPW Director have indicated that sewer flow rates are high during wet weather, which further compromises the sewer system capacity. On-going investigations by the Town's consultant thus far have not identified areas contributing excessive inflow to the sewer system. The consultant will be providing a final report to the Town with potential recommendations for reducing I/I in the near future. Due to the current capacity limitations in the sewer system, the importance of reducing I/I is crucial to the Town. Therefore the final I/I report will be reviewed in the Wastewater Alternatives Analysis phase of the CWMP to prioritize recommendations for reducing I/I. Controlling I/I within the Town sewer system is also an important goal to relieve stress in the Nashua River Basin. The hydrologic conditions in the basin are summarized in Chapter 5 of this report.

5. Water Supply Needs Analysis

5.1 Introduction

The purpose of the Water Supply Needs Analysis is to identify discrepancies between water demand and available water supply in Westminster. The first two sections of the chapter review historical demand and utilize available reports, planning forecasts, and consumption trends to project future water demand in Town. The following two sections identify the permitted supply allowable from existing sources and the current capacity of these sources to determine the ability of the Town's supply to meet future water demands. Prior to presenting conclusions, the Analysis reviews the impacts of water supply withdrawals on the Nashua River Watershed.

5.2 Historical Water Demand

The Existing Water Supply narrative in Chapter 3 of the CWMP reviews historical water consumption in Town water system from 2000 to 2005. The data is provided in its various categories to allow an understanding of how water consumption occurs. It is also provided as average daily demand and maximum daily demand to understand how much consumption is occurring in Town on an average day and a maximum day during a given year. This representation of the data will be used in projecting water use trends into the future. The historical water demands in Table 5.1 are taken from Chapter 3, and are provided below as the basis for water demand projections in this chapter.

Table 5.1
Historical Water Demands

Year	Average Daily Demand (gpd)	Maximum Daily Demand (gpd)
2000	216,491	459,200
2001	330,419	663,200
2002	376,273	639,800
2003	427,176	768,900
2004	352,528	869,000
2005	360,216	644,000

Due to the inconsistency of the domestic water consumption data for the year 2005, and the concern that it may be due to a reporting error as detailed in Chapter 3, the data for year 2005 was not utilized for the purposes of projecting water demand.

5.3 Projected Water Demand

The *Hydrologic Assessment of the Nashua River Watershed*, completed by CDM in June 2002, provided an analysis of the existing and future water supply needs for those communities residing in and obtaining water from the Nashua River Basin. CDM's projections of future water demand were compared to an earlier *Inventory and Analysis of Present and Future Water Needs* for the Nashua River Basin completed by DWR (Division of Water Resources, now Water Resources Commission) in 1989 using the Department of Environmental Management (DEM) "Old Water Needs Forecasting Methodology." CDM anticipated the Town of Westminster water system would require 0.37 million gallons per day (mgd) of water on an average daily basis in the year 2020, while the DWR/DEM projection indicated Westminster would require approximately 0.55 mgd.

The water demand projection for Westminster, provided by CDM, appears low based on historical data. Westminster exceeded the CDM projection for 2020 in both 2002 and 2003. The DWR/DEM projection appears more appropriate for planning purposes based on the historical data. The CDM projections are based on a starting year of 2000 and the CDM report indicates that the CDM calculated water demand for Westminster for the year 2000 is 0.24 mgd. Alternately, the DWR/DEM projection for 2000 is 0.33 mgd. This data suggests that during the time the DWR/DEM projections were calculated, water demand trends in Westminster may have reached a peak, possibly based on increased industrial water use. Water demand trends also may have dropped off leading up to the year 2000, when the CDM projection was calculated. Since water demand has increased significantly since 2000, the CDM projection now underestimates future water use.

The variable nature of historical water demand in Town requires that the forecasting exercise be repeated using the CDM methodology and more recent historical water demand data. The CDM methodology is summarized in Table 5.2.

Table 5.2
CDM Water Needs Forecasting Methodology

Given:	Calculate:
Base population *Base water demand* *Base service population %*[1] *Population projections (from regional agency)* *% Domestic use, % Non-Domestic use,* *% Unaccounted-For use*	*Base service population:* = Base population x Base service population % *Base domestic demand (gpcpd):* = (Base water demand x % Domestic use) / Base service population *Base non-domestic demand (gpcpd):* = (Base water demand x % Non-Domestic use) / Base population *2025 service population %:* Increase at 10% per decade if less than 90% of total *2025 service population:* = 2025 population x 2025 service population %
CDM Method #1:	
Use water consumption categories from Chapter 3 to calculate 2025 domestic, non-domestic, and unaccounted-for water demands. *2025 domestic demand*[2]*:* 2025 service population x Base domestic demand (gpcpd) *2025 non-domestic demand*[3]*:* Base non-domestic use (gpd) + (population change x Base non-domestic demand (gpcpd)) + non-domestic use (gpd) growth *2025 unaccounted-for water demand:* Use % unaccounted-for use if less than 10%, or if greater than 10%, decrease to 10% by 2025 **2025 Demand = domestic demand + non-domestic demand + unaccounted-for water demand**	

1. Base service population % was calculated using the reported number of residential water service connections and multiplying it by the average number of persons per household obtained from 2000 U.S. Census data for Westminster (2.73).
2. Base domestic demand (gpcpd) was replaced with 65.0 gpcpd, as this is expected to be a DEP standard for domestic water consumption in stressed river basins.
3. Additional non-domestic use based on growth trends has not been included in these projections. It was assumed to be zero through 2020 in the CDM projections.

Chapter 3 provides the necessary data for each category of water use to calculate the projections based on the previous methodology. The Massachusetts Institute for Social and Economic Research (MISER) has updated its population projections to account for the 2000 census data, as of December 2003. Details of their methodology and the resulting projections for each Massachusetts community are available on their website at: http://www.umass.edu/miser/population/miserproj.html. Table 5.3 summarizes the MISER

population projections for the Town of Westminster. These projections are also provided in Chapter 1 of this report.

Table 5.3
MISER Population Projections for Westminster

Year	"Middle" Projection
2000 Census	6,907
2010 Projection	7,395
2020 Projection	7,953
2025 Projection	8,484

The MISER projections terminate at the year 2020; however, the planning period of this CWMP extends to 2025. Using the methodology in Chapter 1, population in 2025 will be approximately 8,484 people, based on the 1.3% annual growth rate experienced over the past decade. These updated "middle" range MISER population projections and the calculated projection for 2025 can be used with the CDM water needs forecasting methodology.

The CDM methodology was followed, using their "Method #1," with the following exceptions:

- The base service population was calculated from the number of residential water service connections, as provided in the MA-DEP Annual Statistical Reports for the Town. This number was multiplied by the average number of persons per household obtained from 2000 U.S. Census data for Westminster (2.73). This calculation is also explained in Chapter 3.
- A base domestic demand of 65.0 gpcpd was utilized with population projections for estimating domestic water demand projections. This is expected to be a DEP standard for domestic water consumption with public water suppliers located in stressed river basins. This number is consistent with the Westminster average domestic water consumption of 65.9 gpcpd from 2000 to 2004 provided in Chapter 3.
- Additional non-domestic use based on growth trends has not been estimated for the purposes of these projections. It was assumed to be zero through 2020 in the CDM projections.

For the data period utilized for these projections (2000 to 2004), the historical average daily demand for the Town water system fluctuated between 0.22 mgd and 0.43 mgd and the historical maximum daily demand fluctuated between 0.46 mgd and 0.87 mgd. The ratio of maximum daily to average daily demand can be used to project maximum daily demand into the future. Using the average of this ratio since 2000, and multiplying it by the calculated average daily demand projections will yield maximum daily demand projections. The average ratio over the 5-year period is 2.02, as provided in Chapter 3. Table 5.4 summarizes the forecasted average daily demand projections using population data, and the calculated maximum daily demand projections, using the average demand ratio.

Table 5.4
Projected Water Demand

Year	Average Daily Demand (gpd)	Maximum Daily Demand (gpd)
2004[1]	352,528	869,000
2010	428,800	866,200
2020	512,300	1,034,800
2025	568,900	1,149,200

1. Year 2004 data is actual demand provided for comparison.

Comparing these projected water demands with previous projections shows that they fall within the range of available forecasts. Using the year 2020 projection for comparison shows the CDM estimate at 0.37 mgd, the S E A estimate with CDM methodology at 0.51 mgd, and the DWR/DEM estimate at 0.55 mgd.

5.4 Permitted Water Supply

Westminster's existing Water Withdrawal Permit under the authority of the MA-DEP Water Management Act (WMA) for water supply withdrawals from Meetinghouse Pond was modified to an emergency withdrawal permit on March 18, 2003. The permit only allows emergency withdrawal of water by the Town. Since Westminster purchases water supply from the City of Fitchburg, it is the responsibility of Fitchburg to maintain a WMA permit that incorporates Westminster's water use.

Therefore, the current limitation to Westminster's water supply is that contained in the intermunicipal agreement (IMA) with Fitchburg. As detailed in the Existing Water Supply narrative (Chapter 3), the agreement allows Westminster to obtain a maximum daily flow up to 0.87 mgd. The Town is allowed to exceed this usage for a total of seven days in a calendar year. Based on the revised water demand projections developed in this chapter, there will be a water supply surplus of approximately 300,000 gpd on an average daily basis by the end of the planning period.

The revised water demand projections indicate that maximum daily demand may exceed the permitted supply amount with Fitchburg at some point between the year 2010 and 2020. The maximum daily demand is the largest demand in the water system over a 24-hour period during the course of a year. A maximum daily demand of 0.869 mgd that occurred in Town on September 14, 2004 nearly reached the permitted supply amount with Fitchburg; however, the maximum daily demand in 2005 was 0.644 mgd. The IMA allows the Town to exceed the threshold (0.87 mgd) for a total of seven days in a calendar year without triggering requirements to renegotiate overall capacity and cost sharing with Fitchburg. Also, only water used for consumption shall be included in the usage measurement regarding the Fitchburg agreement. Water used for non-consumptive uses such as fire fighting and water main breaks shall not be included. Although the maximum daily demand occurs over a single 24-hour period, daily water demands surrounding it are typically higher than average. Therefore, the Town should monitor maximum daily demand and other extended periods of high demand each year to determine if this 7-day threshold will be exceeded in the future. S E A estimates a potential water supply deficit by the end of the planning period based on the projected maximum daily water demand exceeding the permitted supply amount stipulated in the IMA with Fitchburg. This is summarized in Table 5.5.

Table 5.5
Estimated Water Supply Deficit on Maximum Day

Year	IMA Maximum Daily Supply (mgd)	Projected Maximum Daily Demand (mgd)	Potential Supply Deficit (mgd)
2004[1]	0.87	0.869	(0.001)
2010	0.87	0.866	(0.004)
2020	0.87	1.035	0.165
2025	0.87	1.149	0.279

1. Year 2004 data is actual demand provided for comparison.

Since the potential supply deficit is small, the permitted amount may not be exceeded for a full 7-days in a given year. If the Town exceeds the threshold, Fitchburg can require that the allowable maximum daily flow be renegotiated. Westminster has the right to obtain a maximum daily flow up to 1.5 mgd as "Reserve Capacity," based on the IMA. However, this additional supply will require Westminster to pay a greater share of the treatment plant capital cost and the operations and management cost for water used. Additional capital cost sharing is an expensive option for the Town and should be avoided unless absolutely necessary, especially since water demand on an average daily basis is not estimated to be near the threshold of 0.87 mgd by the year 2025.

Estimates of future water use are based on assumptions and historical trends over the past five years. Water use trends and growth patterns in Town may change over time and impact overall water demand.

5.5 Water System Capacity

The Town relies on the Hager Park Pump Station to deliver water from the Fitchburg water treatment plant to the water system. The pump station capacity is 700 gallons per minute (gpm), which equates to a maximum daily capacity of approximately 1.0 mgd. This maximum capacity was calculated assuming continuous operation (24-hours per day). However, this condition places stress on the infrastructure and can have negative long-term impacts. A typical operating scheme for pump stations is 16-hours of use per day. The remaining 8-hours provide downtime for the equipment. Under this operating scheme, the average daily capacity to the Town from this source is approximately 0.67 mgd. The pump station operation schedule can be increased to 24-hours per day during short periods of high demand if necessary.

Based on the assumed operation schedule and the revised water demand projections, the Hager Park Pump Station is capable of meeting water demand on an average daily basis through the planning period of the report. The revised water demand projections indicate that maximum daily demand may exceed the maximum capacity of the pump station (1.0 mgd) at some point between the year 2010 and 2020. S E A estimates a potential water system capacity deficit by the end of the planning period based on the projected maximum daily water demand exceeding the maximum daily pumping capacity of the Hager Park Pump Station. This is summarized in Table 5.6.

Table 5.6
Estimated Water System Capacity Deficit on Maximum Day

Year	Maximum Daily Capacity (mgd)	Projected Maximum Daily Demand (mgd)	Potential Capacity Deficit (mgd)
2004[1]	1.0	0.869	(0.131)
2010	1.0	0.866	(0.134)
2020	1.0	1.035	0.035
2025	1.0	1.149	0.149

1. Year 2004 data is actual demand provided for comparison.

The Town water system should be capable of meeting the maximum daily demand each year without relying on system storage. Storage should be reserved to meet demands during periods of peak consumption and should provide the volume of water required for fire protection. Therefore, a secondary source of supply for the Town would be required to meet maximum daily demand if the pump station capacity is exceeded. Similar to the recommendation in the previous section of this chapter, the Town should monitor maximum daily demand and other extended periods of high demand each year to determine if the pump station capacity will be exceeded in the future.

5.6 Emergency Water Supply

Although the Hager Park Pump Station has emergency power supply, it is the only active source for the Town water system. In case of an emergency at the pump station or at the treatment plant supplying the pump station, Westminster would rely on its emergency supplies. The MA-DEP *Guidelines and Policies for Public Water Systems* and the AWWA *Distribution System Requirements for Fire Protection Manual* describe that "[with] any pump out of service, the remaining pump or pumps shall be capable of providing the maximum daily pumping demand of the system." Consequently, the South Street Pump Station capacity should be reviewed in case the Hager Park Pump Station becomes temporarily inoperable.

The South Street Pump Station capacity is 600 gpm, which equates to a maximum daily capacity of approximately 0.86 mgd. This available supply was calculated assuming continuous operation (24-hours per day). It is expected that a 24-hour per day operating scheme would be used as necessary to meet demand during a water supply emergency. Based on the assumed operation schedule and the revised water demand projections, the South Street Pump Station is capable of meeting water demand on an average daily basis through the planning period of the report. The historical water demand data indicates that maximum daily demand already exceeds the maximum capacity of the emergency pump station (0.86 mgd). S E A is assuming that a water supply emergency would be a temporary situation and that the annual withdrawal limit of 100 mgy from Meetinghouse Pond without payment to Fitchburg would not be exceeded. This assumption also applies to the annual withdrawal permit limit of 190 mgy with DEP.

The emergency supply is capable of meeting water demands on an average daily basis through the planning period of this report. However, the emergency supply is not capable of meeting current maximum daily water demands based on the limited capacity of the South Street Pump Station. It is important to note that the authorized maximum daily withdrawal limit for Meetinghouse Pond is 1.03 mgd, based on the safe yield of the pond detailed in Chapter 3. During a water supply emergency, the Town would need to coordinate withdrawals with Fitchburg to prevent the safe yield from being exceeded.

5.7 Nashua River Basin

The Massachusetts Water Resources Commission classifies the Nashua River Basin as a medium-stressed basin in its 2001 *Stressed Basins in Massachusetts* report. A stressed basin is defined therein as one in which "the quantity of stream flow has been significantly reduced, or the quality of the stream flow is degraded, or the key habitat factors are impaired." The report based the assessments on an analysis of stream flow data, water quality data, and habitat data. The report did not review individual river sub-basins on a statewide level; however, it provided recommended guidelines for doing so.

CDM prepared a *Hydrologic Assessment of the Nashua River Watershed* for the Massachusetts Executive Office of Environmental Affairs – Nashua River Basin Team, in June 2002. The assessment investigates water withdrawals and wastewater discharges in the basin to identify their impact on river flow and provide a basis for future water management planning. In addition, the assessment includes the effects of population growth and associated increases to water demands and wastewater discharges in the basin. The steps of the hydrologic assessment include the following: 1) collect background information such as water supply, stream flow, population projections, regulatory information, and wastewater disposal; 2) evaluate potential impacts such as future water supply needs and risks to resources; 3) assess wastewater discharge conditions and future plans for sewer expansions; 4) assess the inflow and outflow of water from each sub-basin under current and future conditions; 5) estimate the virgin, or natural stream flow from each sub-basin; 6) determine the impacts on stream flow in each sub-basin using the results of the inflow/outflow analysis; 7) identify stressed sub-basins using the recommended guidelines set forth in the Water Resources Commission stressed basins report.

The inflow/outflow analysis performed in the hydrologic assessment calculates sub-basin water balances for present conditions (2000) and future conditions (2020). In both scenarios, water balances were calculated for average annual, average August, and average winter conditions. There are three Nashua River Sub-Basins that encompass significant land area in Town. These are the Flag Brook, Whitman River, and Phillips Brook sub-basins. Refer to Figure 5-1, attached at the end of this report (prior to appendices), for the locations of these sub-basins. The results of the analysis estimate that the Flag Brook Sub-Basin experiences a net water loss of approximately 4.06 mgd, the Whitman River Sub-Basin experiences a net water loss of approximately 0.97 mgd, and the Phillips Brook Sub-Basin experiences a net water loss of approximately 0.89 mgd under present average annual conditions (2000). The significant loss in the Flag Brook Sub-Basin is primarily due to water supply withdrawals from surface water bodies in the sub-basin; therefore, the net water loss is higher under August conditions than under winter conditions. Conversely, the losses in the Whitman River and Phillips Brook sub-basins are primarily due to wastewater collection; therefore, the net water loss in these sub-basins is higher under winter conditions than under August conditions. The analysis predicts the net water loss in the Flag Brook Sub-Basin to increase approximately 0.40 mgd and the net water loss in the Whitman River Sub-Basin to increase nearly 0.50 mgd under future average annual conditions (2020). The analysis predicts the net water loss in the Phillips Brook Sub-Basin to decrease slightly under future average annual conditions (2020) due to increased water distribution and decreased wastewater collection in the sub-basin. The report does not explain why wastewater collection is predicted to decrease into the future.

The hydrologic assessment uses these results to estimate overall changes to stream flow from virgin conditions to present and future conditions. Changes in stream flow were calculated under several scenarios for comparison. Using the state guidelines to estimate stress level, the report concludes that one sub-basin, the Flag Brook Sub-Basin, currently exhibits high stress (net average August outflow equals or exceeds estimated natural August average flow). The Whitman River and Phillips Brook sub-basins currently exhibit low stress. There are other Nashua sub-basins that exhibit medium stress under current conditions, according to the report. Under future conditions, there are six sub-basins estimated to have a medium stress level and one additional sub-basin estimated to have a high stress level. This future high

stressed basin is the Monoosnoc Brook Sub-Basin, located to the southeast of Town. The report notes that most of the stressed basins, including Flag Brook, have multi-month reservoirs that can store large flows in the spring and release them during low flow periods in the late summer. It suggests that the elevated stress predicted in the August scenario may not be as extreme as the data suggests; however, more detailed study is required to investigate potential releases from reservoirs.

The hydrologic assessment does not investigate very large water supply withdrawals from the City of Worcester and the Massachusetts Water Resources Authority that occur in the Nashua River headwaters, yet predicts elevated stress in many of the sub-basins. Therefore, the basin as a whole is in need of improved water use management to reduce stream flow impairment where possible. In addition to further study, the report recommends critical review of any new water supplies proposed in stressed sub-basins; implementation of water conservation plans for communities in stressed sub-basins; assessment of impacts to aquatic habitat from low stream flow; critical review of new sewering that would export wastewater from stressed sub-basins; and analysis of opportunities for water reuse or imported wastewater recharge in stressed sub-basins.

5.8 Needs Analysis Conclusions

The Town of Westminster is facing a potential water supply deficit and a potential water system capacity deficit by the end of the planning period, based on estimated projections. If water use continues to follow recent trends, there may not be adequate supply available during periods of maximum demand under the current agreement with Fitchburg. Conversely, the supply appears sufficient during average conditions throughout the entire planning period.

The Town water system appears capable of delivering available supply under average conditions based on the projections. However, the Hager Park Pump Station may not be able to meet maximum daily demand by year 2020 and the emergency pump station at South Street cannot meet current maximum daily demands.

While average daily demands have fluctuated within a small range since 2001, maximum daily demand has steadily increased. The ratio of maximum daily to average daily demand reached a high in 2004 for the period of record (2000-2005). As described in Chapter 3, maximum daily demand typically occurs during an extended period of elevated water consumption and is a key factor in determining the adequacy of a water system and its supply. It is usually attributed to seasonal water use during the summer, and a major component is outdoor use.

The Nashua River Basin is classified as a medium-stressed basin due to stream flow impairment issues previously detailed in this chapter. The Flag Brook Sub-Basin was determined to be a high-stressed sub-basin of the Nashua watershed and is located mainly within the Town. It is estimated that increased water withdrawal and wastewater collection within this sub-basin will create more water imbalance and impact stream flow in the future.

5.9 Recommendations

The Town should monitor maximum daily demand and other extended periods of high demand each year to determine if it will exceed the permitted daily water supply threshold (0.87 mgd over 7 consecutive days) and the water system maximum daily capacity (1.0 mgd). In order to sustain long term water supply and system capacity, the Town should strive to reduce seasonal water demand in the water system. Reduction of overall water use through water conservation will also preserve the Town's supply and reduce impacts to stressed basins in the Nashua River Watershed.

5.9.1 Water Conservation

The Town has implemented effective programs and made efforts to reduce overall water consumption. However, the Town should continue to enhance these programs and increase efforts through a variety of methods. The following recommendations are based on those provided in the 1992 *Water Conservation Standards for the Commonwealth of Massachusetts*. These standards can be accessed on the Massachusetts Water Resources Commission website for more detail regarding particular activities. The website is located at the following address:
http://www.mass.gov/envir/mwrc/pdf/Conservation_Standards.pdf.

The recommendations are summarized as follows.

- Public Education: The Water Department currently provides public education through flyers and bill stuffers. The standards recommend that additional education be coordinated with local schools and suggest that the largest users be targeted for enhanced education.
    - The Town should increase education and overall awareness of water conservation benefits, including alternative landscape and gardening practices that reduce irrigation needs.
- Leak Detection: The Water Department currently surveys approximately 10-percent of the water system for leaks each year. The standards recommend a full leak detection survey every two-years.
    - The Town should increase the amount of the water system surveyed each year to meet the standards and to achieve the goal of 10-percent unaccounted-for water use.
- Metering: The Water Department is currently working towards metering 100-percent of the water system, including all municipal buildings. The standards recommend that meters be replaced every 10-15 years, with more frequent maintenance for large commercial meters. The standards recommend that billing for domestic accounts should be done quarterly and billing for the largest users (commercial/industrial) be done monthly.
    - The Town should maintain and replace its new remote-read meters per the standards.
    - With new meter reading capabilities, the Town should increase the billing frequency to meet the standards.
- Pricing: The current Westminster water rates for its customers were enacted approximately 10-years ago. The standards recommend that water suppliers regularly evaluate existing rate structures, and "consider adopting increased seasonal rates to moderate peak demands and/or to protect/maintain (water) supply levels."
    - The Town should conduct a full water and sewer rate study that considers seasonal use mitigation.
- Residential Water Use: The Town currently makes water savings devices available to customers for purchase. In additional to the devices, the standards recommend that water suppliers make educational literature available regarding installing water savings devices and their potential savings.
    - Conservation, outdoor watering, landscaping, and water re-use practices should be encouraged by the Town and literature should be made available. Residential water audits should be made available upon request.
- Public Sector Water Use: The Water Department meters all municipal buildings. Water savings devices and fixtures were recently installed in all municipal buildings.

- Water used by contractors for construction activities should be metered and they should be charged, with service fees.
- Irrigation systems for municipal properties should be automated with timers and moisture sensors.
- Strict plumbing codes and conservation measures should be applied to new and renovated buildings.

- Industrial and Commercial Water Use
  - Large commercial and industrial users should develop their own water policy addressing conservation, leak detection and repair, maintenance, and education. These users should install water savings devices and fixtures and conduct a water audit to determine additional means to reduce consumption. Technical assistance is available at the state level through the Massachusetts Office of Technical Assistance (OTA), a non-regulatory branch of the Executive Office of Environmental Affairs (EOEA) that helps manufacturers and industrial facilities, municipalities, schools and hospitals, households and others improve water use efficiency, reduce wastewater discharge, and implement other effective water conservation measures.
  - Strict plumbing codes and conservation measures should be applied to new and renovated buildings.
- Water Supply Management: The Town currently has a water use restriction by-law that was approved by the MA-DEP. The standards recommend that a water system audit and/or water conservation plan be completed every three to five years to determine potential areas for increased conservation. The standards suggest that suppliers investigate the potential for water system interconnections with neighboring communities for emergency supply.
  - The Town should conduct a water conservation plan that focuses on seasonal use.
  - The Town should investigate the potential for permanent interconnections with other communities besides Fitchburg.

5.9.2 Municipal Water Supply

The potential groundwater well site near Honey Bee Lane, described in Chapter 3, appears favorable based on previous studies. The Town has already taken many steps to secure this site as a future water supply to the municipal water system. Based on the estimated pumping capacity reported during the 1986 pump test, this well could supply up to approximately 0.54 mgd of water on an average daily basis and up to 0.80 mgd on a maximum daily basis. This water supply would meet the needs of the Town beyond the planning period, based on the revised water demand projections. The results of the additional well investigations by Earth Tech in 1994 estimate that a deeper well could yield up to approximately 0.96 mgd of water on an average daily basis and up to 1.44 mgd on a maximum daily basis. However, a prolonged pump test was never conducted to confirm this.

Although there appears to be favorable conditions with respect to aquifer properties, it should be noted that the well site lies within the Flag Brook Sub-Basin. The Nashua River Watershed hydrologic assessment estimates this sub-basin to have the highest stress level within the watershed. A new water supply within this sub-basin must be carefully considered as it will likely receive critical review by permitting authorities.

Development of a new municipal groundwater well will require the completion of the MA-DEP "New Source Approval Process" as defined in the Guidelines and Policies for Public Water Systems. This

approval process is required by the DEP for new source approval and includes a variety of tasks such as delineation of wellhead protection areas, prolonged pumping tests, and implementation of groundwater monitoring well programs. Although many required tasks have already been completed, it is expected that the permitting process would take approximately five to seven years in its entirety to gain new source approval. Additionally, a range of environmental laws apply to the development of this site as a new potable water source, which include the following: Safe Drinking Water Act, Water Management Act, Wetlands Protection Act, Interbasin Transfer Act, Endangered Species Act, and Clean Water Act.

In addition to the required permitting and construction of a pump station, the Town must purchase the remainder of land within the Zone I; the Town must install a significant length of water main to connect the well to the water system; and the Town must install a water storage tank within the "Middle" pressure zone near the well site for it to pump into. The Town has previously purchased land along Route 140 for a potential water tank site. These additional requirements represent significant capital expenditures to the Town.

The Town also has the option of increasing the amount of water supply obtained from the Fitchburg water treatment plant at any point in the future, based on the details of the intermunicipal agreement. The agreement, detailed in Chapter 3, allows Westminster to increase permitted maximum daily flow up to 1.5 mgd in the future. This is a water supply increase of almost 75-percent more from the current permitted maximum flow (0.87 mgd). This water supply would meet the needs of the Town beyond the planning period, based on the revised water demand projections. There is potential for even more supply than this under the terms of the agreement, until it is sold to another community. Westminster has first right to all excess capacity. The only permitting requirements of this option would be to revise the current agreement with Fitchburg.

A previous cost estimate for a new gravel-packed groundwater well supply at the potential well site was provided for the Town in 1994. The various cost components of a new well include the permitting, land purchase, and infrastructure components previously described. Treatment for corrosion control will be necessary and previous investigations suggest that the water supply may require treatment for manganese also. The operation and maintenance of this supply source will present a recurring cost to the Town also. The schedule is dictated by the permitting, which is estimated at approximately five to seven years before design and construction can proceed.

The current cost to obtain water supply from Fitchburg will increase proportionately with the amount of additional supply requested. The costs for water supply consist of a portion of the treatment plant capital cost and the operations and management cost for water used. These costs are explained in more detail in Chapter 3 of the report, and are assessed based on a ratio of Westminster's maximum capacity allotted from the plant divided by the overall capacity of the plant. Operations and management cost for the plant is based on the actual cost to operate and maintain the plant and is assessed monthly based on a ratio of Westminster's actual usage divided by the total plant usage for the month.

- It appears that developing a local groundwater supply will take longer, require more permitting, and cost more for the Town. S E A recommends that the Town evaluate the costs, schedule, benefits, and impacts of both water supply alternatives to identify the preferred long-term approach for the Town.

5.9.3 Private Water Supply

Data summarized in Chapter 3 of the report indicates a majority of residences in Town obtain water supply from on-site private wells. There are commercial establishments that utilize private wells also. Geologic conditions and aquifer properties throughout most areas of Town are not highly favorable for groundwater wells. Board of Health data regarding existing private wells indicates that wells are

generally deep and some well capacities are low, which confirms the geology. Limited available data suggests that current water consumption from residences with private wells is less than half of that compared with residences connected to the municipal water system.

- S E A recommends that future water conservation programs should include all residences in Town, as those with private wells are just as likely to increase water use during the warmer months as residences connected to the municipal water system.

Residences with separate irrigation wells can also increase outdoor water use without being impacted by higher water bills. Increased seasonal water demand exacerbates the current stress situation in the Nashua River Basin, as previously detailed in this chapter.

Based on the extent of the Westminster water system and historical development rates in Town, there are many areas of Town that will utilize private wells for water supply beyond the planning period of this report. Current zoning designations for undeveloped areas appear to be suitable for future use and protection of private well supplies. There are areas of Town with high development density that utilize private wells, including neighborhoods around Partridge Pond and Wyman Pond. Extending the municipal water system to these areas should be considered as need precipitates.

6. Stormwater Management

6.1 Introduction

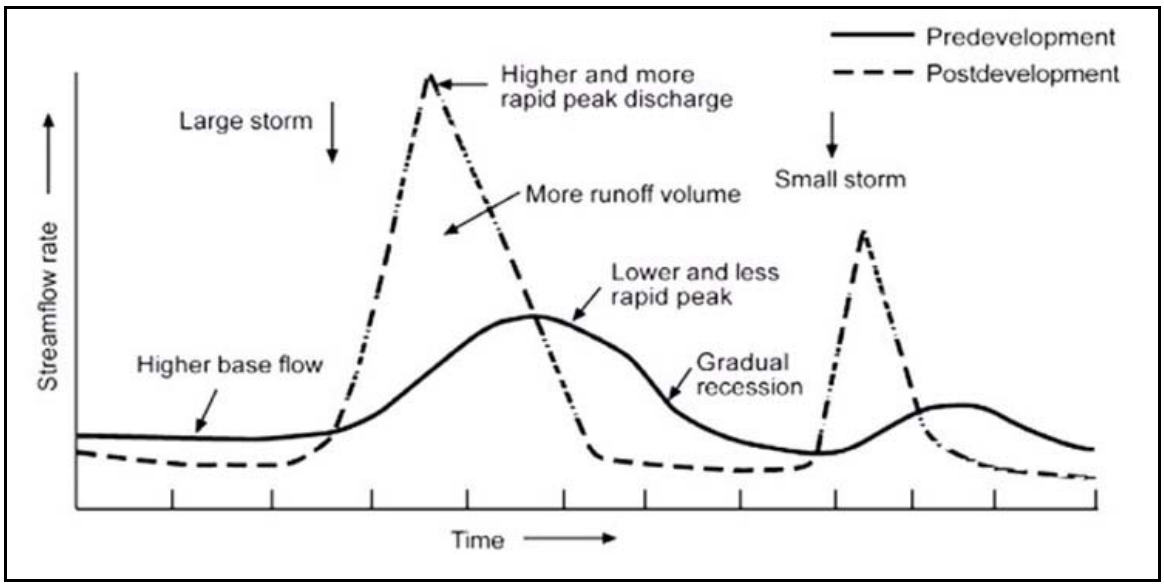
Stormwater management is a very important component of the overall management of water resources in Westminster. The impacts of stormwater runoff and infiltration to both water quality and quantity have become a primary concern to environmental regulators and activists. Inventories of Massachusetts rivers and streams indicate that nearly half of water quality problems in those streams are attributable to stormwater. Long-term monitoring of streamflows indicates that urban and suburban development has reduced recharge to aquifers that supply vital baseflow to rivers during dry weather. While regulation of industrial and municipal wastewater discharges significantly improved water quality in the nation's rivers, regulators have realized the significance of stormwater management for further enhancement of environmental quality. Consequently, federal and state regulators are now focusing increased attention on stormwater discharges and management. The United States Environmental Protection Agency (EPA) has begun wider implementation of the National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Program, which requires municipalities to better manage stormwater discharges. In Massachusetts, Coastal Zone Management (CZM) and MA-DEP have jointly issued the two-volume *Stormwater Policy Handbook*. While these new policies target specific developments for stormwater management (e.g. industrial facilities and new developments near wetlands), Westminster is in a position to take a more aggressive, town-wide approach to stormwater management. This chapter summarizes the stormwater management systems, both physical and procedural, that are currently in place in Westminster and assesses alternatives to improve overall stormwater management.

6.2 Overview of Drainage Characteristics

The hydrologic cycle contains several components. Precipitation, evaporation, groundwater storage, and surface runoff are familiar parts of the cycle. The portion of the hydrologic cycle of particular concern in stormwater management is runoff. Under natural conditions, precipitation is partitioned into runoff (which in theory travels over land directly into a surface water body) and what is often referred to as abstractions. Abstractions include storage in surface depressions (i.e. puddles), and infiltration into the ground. Water that is stored in puddles typically evaporates. Water that infiltrates into the ground is further subdivided. Some water is used by vegetation and subsequently returned to the atmosphere by transpiration. Some water migrates through shallow soil matrices, while some water infiltrates into deep groundwater storage. Runoff causes rapid increases in flow volumes in rivers and streams. That volume is quickly discharged by the streams to rivers, and eventually the ocean. Infiltration, particularly deep infiltration, recharges groundwater aquifers that store water for gradual release during dry periods. Therefore, groundwater storage has the dual advantage of reducing flood flows and maintaining streamflows during both short and extended droughts.

Environmental associations and agencies have documented the effects and impacts that development has on runoff characteristics. The impervious areas created by development reduce the surface area of soils that allow infiltration. In addition to eliminating groundwater recharge, these impervious surfaces cause precipitation to run off very rapidly and cause localized flooding situations. Due to the public safety and property damage issues associated with floods, most development is accompanied by storm drains, or storm sewers, that transport the excess runoff away from people and property. Unfortunately, this solution exacerbates the flooding problems in the receiving rivers and streams. This situation is illustrated in Figure 6-1 below. Post-development streamflows depicted by the dashed line on the graph are lower than natural streamflows during dry periods and significantly higher than natural flows immediately following storms.

Figure 6-1
The Effects of Urbanization on Stream Hydrology



Changes in stream hydrology as a result of urbanization (Schueler, 1992).

In addition to changing streamflow characteristics, urbanization introduces pollutants into runoff that subsequently present serious contamination problems in the receiving water bodies. The second volume of the *Stormwater Policy Handbook* published by MA-DEP describes the water quantity and quality changes surrounding development very well. A copy of the Handbook can be obtained online at the following URL:

http://www.mass.gov/dep/water/laws/policies.htm#storm

6.3 Areas Serviced by Municipal Storm Drainage Systems

To manage stormwater in developed areas, drainage systems are generally used as a method of collecting and conveying stormwater directly to water bodies such as lakes, rivers, streams and wetlands. Municipal Separate Stormwater Sewer Systems (MS4s) are defined under the Code of Federal Regulations 40 CFR 122.26(b)(8) as "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or stormdrains)." The defined characteristics of a municipal separate storm sewer system include any conveyance system that is owned by the Town or a public body, and was constructed with the purpose of accumulating and transporting water; however, it does not include a combined sewer or part of a public treatment works. Examples of public bodies include state departments, universities, and hospitals.

H_2O Engineering Consulting Associates, Inc. (H_2O) assisted S E A with various stormwater activities for the CWMP. H_2O's primary task was to conduct a town-wide storm system survey and prepare a stormwater system map. H_2O met with the Westminster DPW Director, the Highway Superintendent, and the Town Planner in 2005 to compile plans depicting drainage systems. A total of sixty individual plan-sets were provided to H_2O for use in preparing a stormwater system map. Plans with known dates ranged from 1925 to 2005. Brown and Caldwell previously prepared stormwater mapping in Town and provided a detailed plan to H_2O in digital Geographic Information System (GIS) format for incorporation in the town-wide mapping. The plan is titled "Site Plan – Westminster Stormwater Outfalls – Urbanized Area" and includes drainage systems and outfall locations within a specified portion of Town (as explained in the following section). It also includes significant detail of the types of drainage systems encountered.

After plans were collected, H_2O performed a visual survey in areas of Town to confirm and supplement the existing data. The completed Westminster stormwater system map depicts drainage systems, outfall locations, and receiving water bodies. Large-format copies of the map were prepared for the DPW and provided in 2006. A smaller version of the map was included in the CWMP for reference purposes. It is attached at the end of this report (prior to appendices) as Figure 6-2.

A review of the stormwater system map indicates portions of Town have stormwater systems as defined under the code of regulations. These systems take many forms throughout the Town, and are used in certain areas. Specifically, systems serve Town Center, dense residential areas, industrial facilities, and major traffic corridors. The systems differ based on the age and amount of development in the area they service. Highly populated or densely developed areas tend to have larger systems that service whole neighborhoods, while areas that are older or less populated have smaller systems consisting of only a few catch basins to divert stormwater to a nearby stream, pond, or adjacent wetland. Eleven areas of Town are serviced by substantial stormwater systems including:

- South Ashburnham Road from Bean Porridge Hill Road to State Road East
- North Common Road and Oakmont Avenue
- Betty Spring Road
- The Simplex Industrial Park and Bacon Street
- State Road East
- Shady Avenue
- Town Center
- Village Inn Road/North Narrows Road
- Partridge Lane
- Ellis Road and Carter Road
- East Road at Wyman Pond

Large industrial facilities in Town use stormwater collection systems specifically for the site, and include collection for both parking lot and roof runoff. Newer facilities employ the use of structural best management practices, such as retention ponds and detention basins to reduce stormwater runoff from the site. The Simplex industrial park has multiple detention basins in use.

Major traffic corridors for the Town include Route 2, Route 2A, Route 12, Route 31, Route 140 and the Boston and Maine rail line, and all are serviced by some form of MS4. Main roads in the Town, such as State Road East (Route 2A) and Main Street (Route 140) are serviced by stormwater collection systems along those routes. Drainage along the Route 2 corridor is a series of small systems used to collect water from the roadway and divert to nearby wetlands, streams and drainage ditches that ultimately discharge to surface water bodies. There are no specific drainage systems along the Boston and Maine line; however, most of the water is diverted by drainage ditches running parallel to the tracks and discharged to connecting brooks and surface water bodies.

6.4 Stormwater Permitting

The EPA Stormwater Phase II Final Rule (December 8, 1999) required operators of regulated small municipal separate storm sewer systems (MS4s) to obtain a NPDES permit and develop a Stormwater Management Plan designed to prevent pollutants from being collected by drainage systems and discharged into local water bodies. Regulated small MS4s refer to MS4s that are located within the boundaries of an "urbanized area" defined by the Bureau of the Census. For Westminster, that area generally includes: South Ashburnham Road, between Crocker Pond and Snows Millpond; the Route 2 corridor; the eastern portion of Wyman Pond extending up to Route 2; Town Center; and the area surrounding Greenwood Pond. The goal of the required stormwater management program is to: reduce

the discharge of pollutants, protect water quality, and satisfy the appropriate water quality requirements of the Clean Water Act.

Brown and Caldwell was retained by the Town to provide services in accordance with the requirements under the NPDES program and to assist the Town with advancing other stormwater management programs. In 2004, Westminster applied for and obtained a NPDES permit. Under the NPDES requirements, Brown and Caldwell developed detailed mapping of the regulated MS4s and stormwater outfalls, summarized in the previous section.

6.5 Receiving Surface Water Bodies

The management of stormwater runoff has become a major concern to regulators and activists because of the effects stormwater can have on surface water bodies. The results of a nation-wide water quality assessment organized by the EPA indicate that a major source of water quality impairment is due to urban runoff and discharges from storm sewers, which was found to be the source of pollution in 13-percent of impaired rivers, 21-percent of impaired lakes, ponds and reservoirs, and 45-percent of impaired estuaries (US EPA 1998. National Water Quality Inventory, Report to Congress, 1996 EPA 841-R-97-008). These pollutants include total suspended solids, nutrients, pesticides, and fertilizers. Previously identified impairments to surface water bodies located within Town are discussed further in Chapter 1 of this report.

Twenty-three major surface waters were identified in Westminster, consisting of eighteen lakes, ponds, and reservoirs, one river, two brooks, and two wetlands. Based on the stormwater system map, there are nine receiving waters in Westminster in which stormwater systems directly discharge through outfalls. A majority of the receiving waters are located within the Nashua River Watershed and consist of lakes and ponds. Other stormwater systems discharge to surface waters through connecting brooks, tributaries, or adjacent wetlands. The remaining systems discharge to basins or ditches for storage and infiltration.

6.5.1 Outfall Locations

As discussed above, many stormwater collection systems or municipal separate stormwater sewer systems serve residential, commercial, industrial, and municipal facilities throughout the Town. The outfalls for these systems are located in a variety of areas, including major surface water bodies and their tributaries, wetlands, and drainage structures. Approximately 197 outfalls were identified through the mapping efforts. The following subsections discuss outfalls located along major surface water bodies.

6.5.1.1 Whitman River

Whitman River flows from west to east across the northern portion of Town. There is some residential development with moderate density situated adjacent to the river along South Ashburnham Road. Three outfalls were located that discharge directly, or within close proximity to the river. They are located near the Fitchburg city-line and discharge from large storm drain systems at West Hill Drive.

6.5.1.2 Crocker Pond

Crocker Pond is located along Whitman River in the northern portion of Town. There is some residential development with moderate density on the northern side of the pond along South Ashburnham Road. One outfall was located that discharges directly to the pond in the southeast corner. It discharges from a medium-sized storm drain system on South Ashburnham Road.

6.5.1.3 Round Meadow Pond

Round Meadow Pond is located in the center of Town, adjacent to Route 2. In addition to major roadway corridors, there is isolated industrial development and some dense residential development near the pond. Six outfalls were located that discharge directly, or within close proximity to the pond. They are located

on the north and east sides of the pond and consist of outlets from small drainage systems on State Road East and other, smaller roads.

6.5.1.4 Wyman Pond

Wyman Pond is located in the southeastern portion of Town. It is mostly surrounded by dense residential development. Seventeen outfalls were located that discharge directly, or within close proximity to the pond. They are evenly distributed around the pond and many consist of outlets from small drainage systems and catch basins.

Wyman Pond has historically exhibited eutrophication and excessive weed growth. A past study indicated that development surrounding the pond contributes a high nutrient loading, as detailed in Chapter 1.

6.5.1.5 Tophet Swamp

Tophet Swamp is located in the western portion of Town. It is mostly surrounded by moderate density residential development. It is also adjacent to two major roadways, which are State Road West and West Main Street. Five outfalls were located that discharge directly, or within close proximity to the swamp. They are located in the neighborhoods around Kendall Court and from West Main Street. They serve large storm drain systems in those areas.

6.5.1.6 Greenwood Pond

Greenwood Pond is located in the western portion of Town, adjacent to the Gardner city-line and Shady Avenue. There is low density residential development around the pond. Six outfalls were located that discharge directly, or within close proximity to the pond. They are located on the north and west sides of the pond on Shady Avenue and consist of outlets from small drainage systems.

Greenwood Pond was placed on the Massachusetts 1998 303(d) list of impaired waterways due to the observation of very dense algae and aquatic plants, as detailed in Chapter 1.

6.5.1.7 Wrights Reservoir

Wrights Reservoir is located south of Greenwood Pond. It is mainly in Gardner with a small portion extending into Westminster. There is low density residential development around the reservoir. Two outfalls were located that discharge directly to the reservoir. They are located on the north and south ends of the reservoir on Minott Road and Whitney Street and consist of outlets from small drainage systems.

Wrights Reservoir was placed on the Massachusetts 1998 303(d) list of impaired waterways due to the observation of very dense algae and aquatic plants. The reservoir has also been listed as a Category 5 impaired waterway in the 2004 Proposed Integrated List of Waters due to the presence of metals, specifically mercury bioaccumulation within fish tissue. The source of the impairment is currently unknown, and is suspected to be related to atmospheric deposition, as detailed in Chapter 1.

6.5.1.8 Upper Reservoir

Upper Reservoir is located along the Gardner city-line in the southwestern portion of Westminster. There is low density residential development around the reservoir. Three outfalls were located that discharge directly, or within close proximity to the reservoir. They are located on the west side of the reservoir on Whitney Street and consist of outlets from small drainage systems.

6.5.1.9 Minott Pond

Minott Pond is located just east of Upper Reservoir. There is little development around the pond with wetlands to the east side. Two outfalls were located that discharge directly to the pond. They are located on the west side of the pond on Minott Road and consist of outlets from small drainage systems.

Minott Pond was placed on the Massachusetts 1998 303(d) list of impaired waterways due to the observation of very dense algae and aquatic plants, as detailed in Chapter 1.

6.5.2 Water Quality Investigation

H_2O assisted S E A with a water quality data inventory and water quality sampling in 2005. The Westminster Board of Health performs water quality sampling in compliance with the Massachusetts regulations for bathing beaches. Water quality analyses were collected from the Board of Health for the past five years. According to the records, there is one public bathing beach located in Town on Wyman Pond at Narrows Road/East Road. The sampling schedule for each year is normally between June and August, starting one week prior to the beach opening and occurring every week during the beach season. Records were available for the 2001 sampling season and from August 16, 2005. The results of the analyses indicate that one sample exceeded the state limits in July 2001.

Based on the stormwater system mapping, H_2O conducted a survey for accessible dry weather sampling locations around sensitive surface water bodies in Town. Dry weather flow in storm drains may be an indication of illicit sewer connections to storm drains or failing septic systems in a particular area of Town. Dry weather sampling is conducted after there has been no precipitation in the vicinity over the preceding 72-hours (3-days). H_2O prepared a preliminary list of potential sampling locations for review by S E A and the DPW. Nine sampling locations were chosen from the preliminary list based on input from the DPW. The dry weather sampling was performed at these locations on July 25, 2005 and August 19, 2005. The samples were analyzed for presence of fecal coliform. Fecal coliform bacteria indicate the presence of sewage contamination of a waterway and the possible presence of other pathogenic organisms. The locations and the results of the analyses are summarized in Table 6.1 below.

Table 6.1
Dry Weather Sampling Results

Sample Location	Description	Fecal Coliform (organisms/100 ml)	
		July 25, 2005	**August 19, 2005**
1	N. Common Road, across from DPW facility	**70**	**440**
2	N. Common Road, near Oakmont Ave. intersection	30	70
3	Simplex Drive, 500-ft north of Overlook Road	< 10	< 10
4	Bacon Street, near Route 2 overpass	10	50
5	Pleasant Street / Main Street intersection	**520**	**40**
6	Eaton Street	< 10	< 10
7	Ellis Road at Partridge Pond	10	10
8	Val Road	--	--
9	Old Town Farm Road	--	90

Sample locations 1 and 5 exhibited high fecal coliform concentrations. For reference, the Massachusetts Surface Water Quality Standards (314 CMR 4.00) indicate that for Class B waters (waters "designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of public water supply with appropriate treatment.") fecal coliform bacteria "shall not exceed a geometric mean of 200 organisms per 100 ml in any representative ser of samples nor shall more than 10-percent of the samples exceed 400 organisms per 100 ml." Class A waters are designated as a source of water supply and have stricter fecal coliform limits and Class C waters are designated for secondary contact recreation and have less strict fecal coliform limits. H_2O presented these results to S E A and the DPW.

Although an exact cause for the high sampling results was not identified, the DPW provided opinions as to the reason. Sample location 1 is across the street from the DPW facility. The outfall was originally connected to the septic tank that serves the facility. The DPW facility was converted from an existing building in the past and record of the septic system piping reconfiguration is not available. Though the piping was likely disconnected from the septic tank, the high fecal coliform levels could be a result of piping leakage. Sample location 5 is at the intersection of Main Street and Pleasant Street. Before this area of Town was sewered, illicit sewer connections to the existing storm drains were cited as the cause of contamination to Round Meadow Pond. Those connections were transferred to the municipal sewer when it was installed. However, there could still be illicit connections that were not transferred or old, failing septic systems still in use causing the high sampling results. S E A suggested additional investigation at sample location 5 under the scope of the CWMP. These activities are discussed further within the following subsection.

H_2O also performed field surveys at each sample location that included evaluation for color, odor, turbidity, floatables, and suspended solids. Dry weather flow was not present at sample location 8 (Val Road) during either sampling; therefore, only a survey was performed at that location. The surveys at locations 1 and 5 indicate certain characteristics that may be indicative of urban activities. During sampling, the discharge at location 1 appeared cloudy and had a rainbow hue. The discharge at location 5 contained bubbles both times. A cloudy appearance can indicate suspended solids, chemicals, or wastewater in the stormwater. A rainbow hue and bubbles can indicate floatables such as oil and detergent in the stormwater.

6.5.3 Additional Investigations

H_2O developed a procedure for investigating sample location 5 with input from the Westminster DPW. The procedure consists of the following:

1. Trace the stormwater flow from the outfall sample location to upstream manholes and catch basins.
2. Perform visual inspection at each manhole and catch basin and collect a sample.
3. Using the sample results, determine the direction of the bacteria source.

H_2O met with the Westminster Highway Superintendent on November 18, 2005 and performed a visual inspection of the drainage system tributary to the outfall at sample location 5 (Main Street at Pleasant Street). Six drainage structures tributary to the outfall were inspected, which include three upstream manholes, two upstream catch basins, and an upstream inlet. The outfall was also inspected. Six samples were collected and analyzed for fecal coliform. The results indicate that all samples had bacteria levels of 10 organisms per 100 ml or less.

The test results from the additional investigations yielded much lower bacteria levels than those from the initial dry weather sampling, and did not indicate sources of the bacteria previously encountered. The difference in the sampling results could be caused by certain factors including groundwater levels, previous rainfall amounts, or duration of dry period prior to sampling.

6.6 Stormwater Management Systems

Communities have been developing stormwater management systems to reduce the amount of water flowing off developed sites and to reduce the effects stormwater runoff can have on the quality of nearby surface water. Generally, the goals of these systems include stormwater treatment, peak flow attenuation, groundwater recharge, and alleviation of localized flooding and inadequate drainage. These goals should be adopted by Westminster to improve stormwater management in Town.

Stormwater management systems that facilitate these goals are known as best management practices (BMPs). BMPs are methods used to reduce or prevent pollutants from reaching water bodies and control the quantity of runoff from a site. They consist of both structural stormwater management technologies and non-structural techniques. An example of a structural technology is a detention basin, constructed to detain storm water runoff to allow particles and associated pollutants to settle and to also provide flood control. A non-structural technique could involve pollution-prevention education for homeowners and/or business owners to help eliminate exposure of materials that are potential pollutants to rainfall or stormwater runoff. Although specific technologies and techniques will be discussed in context, the focus of the CWMP will be to develop preferred stormwater management approaches for Westminster. The implementation of stormwater management approaches can vary significantly in order to attain the goals previously discussed. The EPA recognizes that "effective storm water management is often achieved from a management systems approach, as opposed to an approach that focuses on individual practices. That is, the pollutant control achievable from any given management system is viewed as the sum of the

parts, taking into account the range of effectiveness associated with each single practice, the costs of each practice, and the resulting overall cost and effectiveness. Some individual practices may not be very effective alone but, in combination with others, may provide a key function in highly effective systems." Subsequent sections of this chapter detail how these management systems can be applied to Westminster.

Table 6.3, attached to the end of this chapter, summarizes the most common BMPs used to achieve the stormwater management goals identified in this section. These BMPs include both structural technologies and non-structural techniques, and are grouped by the type of stormwater management goal most effectively achieved. The table identifies the stormwater needs addressed by each BMP and also summarizes specific engineering, environmental, municipal, and population characteristics to assist with evaluating stormwater systems for use in Town.

The table includes a range of engineering criteria that are important to the application of stormwater BMPs and require consideration in the evaluation process. The compatibility or requirements of some stormwater technologies may preclude their use within areas of Town. Environmental and municipal criteria include concerns that particular BMPs may present to the environment or the Town if utilized. Population criteria summarize the aesthetic impacts of stormwater BMPs, which range from having significant to no impacts. The table also includes special considerations, which identifies limitations of particular stormwater BMPs or recommendations to increase their effectiveness.

The BMPs summarized in Table 6.3 are discussed in context throughout this chapter. For more detailed information regarding stormwater BMPs, refer to the EPA web site at the following location:

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

6.6.1 Drainage Structures

A variety of structural best management practices have been employed in Town for stormwater management. These BMPs include detention basins and retention ponds, vegetative swales, leaching pits, and settling ponds. The most commonly used BMPs in Town are retention ponds and detention basins; however, these are generally limited to newer residential developments and industrial developments. Detention basins are generally used to store excess runoff on-site and slowly release it back to the environment to either rivers and streams; whereas, retention ponds store excess runoff for much longer periods and release it only through infiltration into groundwater or evaporation.

Additional types of BMPs identified within the Town include vegetated swales, leaching pits, and settling ponds. Vegetated swales are used as a method to return water to aquifer systems through direct recharge and infiltration. One swale was identified on Church Street near Main Street. The swale is used to infiltrate the runoff from a drain outfall on Church Street and to convey excess runoff into a drain channel that connects to a small wetland. Leaching pits are a method used to infiltrate runoff, and are used in residential areas that do not have extensive storm drain systems or nearby water bodies. For instance, portions of Town Center utilize swales and leaching pits to infiltrate runoff. Settling ponds are comparable to retention ponds as there is no outfall.

6.6.2 Land Use Planning and Management

Another method of stormwater management used by the Town is the implementation of land use planning and control methods such as by-laws and regulations. The Town has specifically addressed stormwater runoff by integrating specific controls into the land development process. The following sub-sections discuss the mitigation strategies enacted by the Town.

6.6.2.1 Zoning Bylaws

Zoning regulations were adopted in Westminster in 1974. The most recent version of the Westminster Zoning Bylaw acquired for the CWMP is dated November 2001. Few references to stormwater control have been adopted into the zoning bylaws, as follows:

- Article III, Chapter 205-9: Westminster established a Floodplain District that restricts development in this overlay district to uses having low flood-damage potential. These include the following: agricultural uses, forestry and nursery uses, outdoor recreational uses, conservation of water, plants, and wildlife, wildlife management areas, recreational paths, temporary nonresidential structures used in connection with fishing, growing, harvesting, storage, or sale of crops raised on the premises, and buildings lawfully existing prior to the adoption of these provisions. No earth or other materials are allowed to be excavated, dumped, filled, or transferred within this district.

- Article XIII, Chapter 205-56: Each application to build, alter, or move a building must include a plan that depicts existing storm drains in the area, in addition to all other pertinent information.

6.6.2.2 Rules and Regulations Governing the Subdivision of Land

The regulations governing the subdivision of land in the Town of Westminster were adopted in 1970 and revised in April 2000 by the Westminster Planning Board. Stormwater references include:

- Article III, Chapter 231-12: For all subdivisions, a definitive plan must be prepared that includes as a requirement, the size and location of existing and proposed storm drains and a profile showing slope.

- Article IV, Chapter 231-16, Item E: Grading at the intersection of ways shall direct the flow of surface water in a suitable manner.

- Article IV, Chapter 231-18: This section details stormwater management design. The section indicates that connections shall be made to existing storm drains, but if adequate capacity does not exist, then only the portion of the proposed development that can be accommodated by the existing system shall be connected. Proposed storm drains shall be extended at appropriate size and slope to adjacent, undeveloped land to allow future extension. Storm drain design "shall include consideration of the entire watershed and the calculations used in designing the drainage system, including area calculation, intensity of rainfall, coefficient of runoff, time of concentration, discharge, pipe coefficients of roughness, and quantity and velocity of flow under design conditions." Additionally, storm drains should be based on a 25-year storm and have minimum flow rate of three feet per second and maximum flow rate of eight feet per second.

- Article IV, Chapter 231-26: Subdivisions requiring significant earth removal are required to prepare and submit an impact analysis which includes evaluation of potential water pollution. The evaluation must review the impact of stormwater runoff on nearby water bodies and on groundwater quality. It must also evaluate flooding potential.

6.6.2.3 Revisions to Rules and Regulations Governing the Subdivision of Land

The Town drafted proposed amendments to the subdivision of land regulations dated December 8, 2004, which were subsequently added to the regulations in January 2005. Stormwater related amendments include:

- Article III, Chapter 231-12: The proposed amendments include the provision that the Planning Board may require drainage calculations and groundwater level and percolation rate data within the area of proposed detention basins and retention ponds as part of the definitive plan.

- Article IV, Chapter 231-18: A major amendment is to require that stormwater management be designed in accordance with the MA-DEP *Stormwater Policy Handbook* referenced previously in this chapter. A management plan shall be designed for the purpose that there will be "no adverse effects created by the proposed rates of runoff for the 2-year, 10-year, and 100-year storms." The USDA SCS TR-20 or TR-55 methodologies shall be used for calculating pre-development and post-development runoff rates. Stormwater should be recharged to the maximum extent feasible rather than piped to surface water.

- Article IV, Chapter 231-18: The amendment includes suggested options and systems to achieve required groundwater recharge with design guidelines.

- Article IV, Chapter 231-18: The amendments address water quality by requiring that BMPs for urban runoff quality be implemented wherever possible in order to minimize the impact the development will have on the quality of runoff. BMPs that may be utilized include vegetated swales, retention areas (dry detention basins), and wet detention.

- Article IV, Chapter 231-26: The proposed amendment states that lots should be developed in a way that there is no detrimental drainage onto another lot, on areas outside the subdivision, onto roadways, or onto wetlands.

- Article V: The amendments include standard details for catch basins and drain manholes. Chapter 231-36 includes a requirement for use of erosion and sedimentation controls at construction sites and removal of accumulated sand and sediment from ways and stormwater systems.

6.6.2.4 Rules and Regulations for Site Plan Approval

The Planning Board adopted rules and regulations in September 2005 governing the submission of site plans for approval. The site plan review process governs proposed development that does not fall under the jurisdiction of the subdivision regulations, such as multi-family housing, and commercial/industrial development. Stormwater provisions include:

- Section 2.1: Site plan submission requirements include delineation of existing and proposed stormwater systems; evaluation of impact from the development on erosion, stormwater runoff, and flooding; and evaluation of impact from construction with protective measures such as erosion controls in place.

- Section 3.5: The regulations provide general guidelines for minimizing land disturbance and erosion.

- Section 3.6: The regulations require development under site plan review to conform to the drainage requirements of the revised subdivision regulations, which includes the use of stormwater BMPs for on-site recharge.

- Section 3.10: Applicants may be required to submit a hazardous materials plan to the Fire Department to assist the Town in case of a spill or other emergency.

6.6.2.5 Board of Health Regulations

The most recent regulations acquired are dated 1998 and address stormwater or water quality impacts as follows:

- Chapter 251: This chapter regulates the storage and disposal of toxic and hazardous products and wastes to prevent contamination of surface water and groundwater.

6.7 Stormwater Management Alternatives

This section of the chapter evaluates stormwater management alternatives to improve future stormwater conditions in Westminster. The alternatives consist of both structural stormwater BMPs and non-structural BMPs, as detailed in Section 6.6 of this chapter. The evaluation also includes potential control methods, such as by-laws and regulations.

6.7.1 Stormwater BMP Evaluation

A general evaluation of stormwater BMPs is provided for potential applications throughout Town. These BMPs may be considered for use by developers in new development or redevelopment where improved stormwater quality and increased groundwater recharge is a goal. They may also be considered by the Town for use in municipal building projects or roadway drainage improvement projects. The most common BMPs as presented in Table 6.3 are used as the basis for this evaluation. The evaluation includes a screening process for major areas of Town where BMPs may be applied. The screening reveals which systems are most appropriate and effective for improving stormwater management conditions in Westminster.

The initial step of the screening process was to identify major areas of Town for which to screen potential implementation of BMPs. Areas were considered based on development type and locations of municipal storm drain systems. They include high and moderate density residential development, industrial areas, municipal sites, and roadways with storm drain systems. BMP technologies and techniques that did not apply to these areas were no longer considered for use. The initial step also included a pre-screening based on a few minimum engineering requirements. Certain BMPs were eliminated for areas that did not meet the minimum requirements. For example, particular BMPs require existing storm drains to function; others require an available site for installation; and further types are not applicable to sites or the land use present. In order to replace a direct outfall with a stormwater retention pond, a storm drain system and outfall must exist. Just as a stormwater retention pond requires existing storm drains, an available site with adequate land area and geologic conditions is also necessary. Finally, techniques such as an animal waste collection program that educates residents on picking up after their pets or a landscape management program are only viable for areas with medium to dense residential development or widespread landscaping, respectively. The pre-screening process yielded a list of alternative BMPs for each area. The next step in the screening process included an evaluation of BMPs for the general areas of Town based on the type of stormwater needs present in the area and the type of stormwater needs addressed by the BMP. The evaluation considered the engineering and environmental characteristics of these systems, in addition to municipal and aesthetic impacts.

6.7.1.1 Residential Areas

There are a number of practices that would benefit water quality in residential areas. Regular street sweeping of dense residential roads around surface water bodies would reduce salt and sediment discharges to water resources. The neighborhoods around Town Center and those surrounding Wyman Pond would benefit the most, and should be considered first for implementation. Education programs should be considered that focus on proper waste storage and disposal, and elimination of excessive landscaping treatment chemicals. A pet waste collection program should be considered to reduce

bacterial loadings to lakes and ponds. The programs should target dense residential areas within close proximity to water resources such as the Partridge Pond area. Targeted street sweeping and education programs are already a part of the Town's NPDES Stormwater Management Plan developed under the existing permit.

To reduce peak runoff and flooding, S E A recommends the use of dry wells for residential roof runoff, especially for older developments that do not have large infiltration systems in place such as retention ponds. Densely populated areas that generate significant runoff would benefit from a stormwater treatment and infiltration system to improve water quality and reduce peak flow to receiving waters, such as infiltration trenches or retention ponds. These "centralized systems" can serve whole neighborhoods by intercepting storm flow from large storm drain systems prior to the outfall and performing treatment and infiltration. During very large storms, excess flow can bypass the system to the outfall.

6.7.1.2 Industrial and Commercial Areas

To improve water quality in industrial and commercial areas, regular parking lot sweeping by businesses and industries with large parking areas would reduce salt and sediment discharges to receiving waters. Landscape management controls should suggest use of alternative landscape species for businesses and industries that do not require regular watering and fertilizer applications. Commercial landscape maintenance is typically performed by professional services, which often apply excess treatment chemicals. Education programs should focus on proper waste storage and disposal. Deep sump catch basins with hoods and/or water quality inlets should be mandatory for industrial development to improve treatment of runoff.

To reduce peak runoff and flooding, the use of dry wells in industrial areas is recommended for uncontaminated roof runoff where there are no existing infiltration systems (contaminated roof runoff should include a water quality inlet). Land use in these areas favors reversed elevation systems (to direct parking lot runoff to adjacent swales) or porous pavement for new or rebuilt parking areas to provide treatment and infiltration. Infiltration catch basins and perforated drainpipe should be avoided within high intensity land use areas like industrial parks because they allow untreated stormwater to infiltrate into the ground. A stormwater treatment and infiltration system should be a required component of industrial and large commercial development. There is typically enough available space on an industrial site to implement one of these systems. It can receive flow from all impervious areas including roof tops.

6.7.1.3 Municipal Sites

BMPs should be considered to improve water quality at municipal facilities and lands. For municipal buildings with large parking areas, such as schools and Town departments, regular parking lot sweeping would reduce salt and sediment discharges to receiving waters. Landscape management controls should suggest use of alternative landscape species for municipal buildings and greater awareness with regard to landscape maintenance for large open areas such as athletic fields and cemeteries. Education programs should focus on proper municipal waste storage and disposal. Deep sump catch basins with hoods and/or water quality inlets should be considered for municipal sites with large areas of impervious surface or high intensity land use, such as schools and the DPW facility.

To manage stormwater quantity at municipal sites, dry wells should be implemented to infiltrate roof runoff. New or reconstructed parking areas should utilize a reversed elevation system, porous pavement, or infiltration trenches with pretreatment to provide treatment and infiltration of parking lot runoff. The aesthetic impacts of a stormwater retention pond are generally not preferred for municipal sites; therefore, an underground system such as infiltration trenches with pretreatment are preferred. These systems can be located beneath parking areas or athletic fields.

A significant portion of the existing municipal roadways in Westminster do not have substantial storm drain systems. These roads utilize single catch basins with outlets at low points or drainage swales and channels to manage stormwater runoff. Areas with substantial storm drain systems were summarized in Section 6.3 of this chapter. The Town can improve water quality along existing roadways through several BMPs. As detailed previously, regular street sweeping of high-traffic roadways is key to minimizing pollutant impact. For areas with storm drains, the Town can conduct phased improvements that implement deep sump catch basins with hoods and/or water quality inlets to improve treatment of runoff. The phasing would target major municipal roadways first. Infiltration catch basins and perforated drainpipe should be avoided within major traffic corridors because they allow untreated stormwater to infiltrate into the ground. They are still useful options for minor roads to reduce localized flooding. For areas with minimal drain systems, a low cost option for the Town is to construct drainage swales and channels at key locations to reduce flooding.

Table 6.2 summarizes preferred BMPs for use in major areas of Town to improve overall stormwater management in Westminster. Since the application of these alternatives can vary, it is important to assess the cost and the level of benefits provided by each of the preferred management approaches prior to making final recommendations for specific uses. Assessing the cost versus the benefits of a non-structural approach can be difficult as well. The following subsection provides some cost and benefit information for preferred management approaches.

Table 6.2
Stormwater BMP Evaluation

General Area	Preferred Management Approaches (BMPs)
High-Density Residential Areas	Regular Street Sweeping, Education Programs, Pet Waste Collection, Landscape Management Controls, Dry Well, Infiltration Trench with Pre-treatment, Stormwater Retention Pond, Detention Basin, Water Quality Swale
Moderate-Density Residential Areas	Regular Street Sweeping, Education Programs, Pet Waste Collection, Landscape Management Controls, Dry Well
Industrial Areas	Parking Lot Sweeping, Landscape Management Controls, Education Programs, Deep Sump Catch Basin with Hood, Water Quality Inlet, Dry Well, Reversed Elevation System, Modular and Porous Pavement, Infiltration Trench with Pre-treatment, Retention Pond, Detention Basin, Water Quality Swale, Filter
Westminster Schools / Municipal Buildings	Parking Lot Sweeping, Education Programs, Landscape Management Controls, Deep Sump Catch Basin with Hood, Water Quality Inlet, Dry Well, Reversed Elevation System, Modular and Porous Pavement, Infiltration Trench with Pre-treatment
Roadway Drainage	Regular Street Sweeping, Deep Sump Catch Basin with Hood, Water Quality Inlet, Infiltration Catch Basin, Perforated Drain Pipe, Water Quality Swale, Drainage Channel

6.7.2 Preferred Stormwater BMPs

The evaluation determined that non-structural approaches were preferred within all areas of Town, and that they are a relatively simple method of improving town-wide stormwater conditions. These approaches include public education, pet waste collection, landscape management, and street sweeping programs. S E A acknowledges that citizen involvement is crucial for successful stormwater management, and is a requirement of NPDES Phase II program. Therefore, the following approaches were established as universal recommendations within Town:

- Distribute education materials to inform citizens about the impacts pollutants can have on stormwater and receiving water bodies and streams. The materials may include methods of reducing pollution. The DPW has already initiated this practice and should continue it on a regular basis.

- Implement training programs to educate municipal employees on stormwater pollution prevention issues. The programs should address general stormwater issues and methods for spotting stormwater runoff problems, illicit discharges, or suspicious storm drain discharges. Employees should be informed of pollution prevention methods and changes in specific operations with which they are involved. The DPW has begun developing training programs and operations procedures as required by the NPDES plan.

- Develop a regular street sweeping program and catch basin cleaning program for targeted areas. Utilize newer vacuum sweepers with the capability of removing fine particulates. Require periodic sweeping by businesses and industries with large parking areas. Develop an operation and maintenance program for other municipal activities, including road salting operations, snow removal, and municipal landscape maintenance and develop a plan with record keeping. The DPW has initiated a regular street sweeping and catch basin cleaning program for targeted areas.

- Educate or establish requirements for businesses and industries to use hardy landscape plants and grasses that require less fertilizer and water than common landscape plants. Require professional landscape services to minimize fertilizer and pesticide use and restrict application during the growing season.

- Encourage or establish requirements for collection and removal of pet waste from roadways, curbsides, driveways, parks, yards, or other areas where the waste can be washed directly into receiving waters. The materials or regulations should include guidance on proper disposal of pet waste.

The evaluation identified preferred structural stormwater management systems for use in specific areas of Town. Prior experience working with Massachusetts communities on stormwater related projects has revealed systems that are used repeatedly because they are the most beneficial and cost effective. These systems should be given priority for implementation and should be considered in new development and redevelopment applications.

- Installing dry wells to collect and infiltrate roof runoff is a relatively feasible and inexpensive method of improving stormwater management town-wide.

  The soil suitability requirements for implementation are present in many areas of Town and the groundwater offset requirements are generally attainable. A standard dry well can be utilized for residential buildings and either a galley or trench system can serve large commercial buildings.

These systems require minimal maintenance and have a long life span. The implementation cost (2006) for a residential unit is approximately $3000, with no expected additional costs for operation over a 20-year planning period. The implementation cost for an average sized commercial/industrial unit is approximately $9000. Based on average annual precipitation data, a typical residential building, and the minimum estimated infiltration capacity, a single residential dry well could provide 500,000 gallons of stormwater infiltration over the 20-year planning period. A single commercial/industrial system could provide 1,000,000 to 4,000,000 gallons of stormwater infiltration over the 20-year planning period. These systems are recommended for new residential development and new commercial/industrial development. They should also be considered for redevelopment that is not currently discharging roof runoff to infiltration units, where feasible.

- A reversed elevation system for new or redeveloped parking areas is an economical method of treating and infiltrating runoff from large impervious surfaces.

  A reversed elevation system pitches parking lot surfaces towards the perimeter to convey runoff to pervious surroundings. Implementation costs for existing parking areas are modest and the additional cost for new parking areas is minor. This system requires minimal maintenance provided there are adequate planted areas to filter and infiltrate runoff. In most cases, standard parking lots already have perimeter landscaping or planted islands that necessitate maintenance. With proper subgrade and planted area construction, the life span of this system is long. The implementation cost (2006) for a typical commercial parking lot is in the range of $55,000, with no expected additional costs for operation over the 20-year planning period. Based on average annual precipitation data, a typical-sized commercial parking lot, and the minimum estimated infiltration capacity a reversed elevation system could provide in the range of 5,000,000 gallons of stormwater infiltration over the 20-year planning period. An alternative construction method for large parking lots is to convey runoff to an infiltrating retention pond (infiltration basin) or to infiltration trenches using storm drains. An infiltration basin must be located nearby on site, whereas infiltration trenches can be located beneath the parking lot. Both systems require pretreatment. A reversed elevation system or alternative infiltration system is recommended for parking areas on new or redeveloped sites in order to achieve stormwater mitigation.

- Deep sump catch basins with hoods are an effective method for removing increased sediment, debris, and other pollutants from stormwater runoff and for improving water quality of receiving waters.

  Areas that are subject to high pollutant and winter salting/sanding loadings are candidates for implementation. This includes major traffic corridors in Town, especially roadways within MHD jurisdiction. The implementation cost (2006) for a single unit is approximately $3,200, with no expected additional operation costs from a standard catch basin over the 20-year planning period. An alternative method of improving receiving water quality is to implement a regular operations and maintenance program, which is a component of the Town's NPDES Stormwater Management Plan. Water quality inlets are a supplemental method of achieving improved receiving water quality. These systems are more expensive to implement than deep sump catch basins and also require annual maintenance; however, they efficiently remove contaminated sediment, floating oil, and debris from surface runoff. They are recommended for use with existing storm drains in Town, just upstream of the outfall. They should be considered for areas with a significantly sized storm drain system, areas with high intensity traffic, and areas where the drain outfall discharges directly to surface water or a stream. Outfalls that discharge to swamps and wetlands are a lower priority, as some natural treatment is provided. The

implementation cost for a single unit is approximately $20,000. The total operation cost over the 20-year planning period, including maintenance is approximately $10,000.

- Centralized stormwater treatment and infiltration systems can achieve a high level of stormwater treatment and infiltration. They are an effective management solution and are recommended for large residential development, large commercial development, and industrial development.

  Stormwater treatment and infiltration systems require a significant stormwater flow to make the system viable. They are generally easy to incorporate into the site design for new residential subdivisions and commercial/industrial development. These systems can be challenging to use as a retrofit in areas of existing development. Their application would be most suitable in areas with existing storm drain systems, such as Town Center or South Ashburnham Road. Figure 6-2 provides locations of storm drain systems in Westminster. The system would require a suitable site for implementation. Stormwater infiltration sites require many of the same characteristics as wastewater disposal sites. Limiting groundwater and soil conditions would likely restrict the use of such a system or reduce its capacity. A review of the potential wastewater disposal site screening summarized in Chapter 7 does not indicate candidate sites in densely developed areas that have substantial storm drain systems. The cost for a stormwater treatment and infiltration system (2006) can range between $50,000 and $120,000, with 20-year maintenance costs adding an additional $5,000 to $30,000. The system could provide in the range of 1,000,000 to 5,000,000 gallons of stormwater infiltration over the 20-year planning period.

- Municipal Buildings. The Town should investigate opportunities to increase on-site stormwater infiltration at each of the municipal buildings in Town. Recommendations include constructing systems to infiltrate roof runoff and to treat and infiltrate parking lot runoff. The best opportunity to investigate the feasibility is during the planning stages of proposed renovations and redevelopment.

6.7.3 Stormwater Regulations

To ensure proper stormwater management and the implementation of BMPs throughout Town, appropriate regulations are necessary. The Town has taken the initiative to begin the inclusion of improved stormwater management controls into regulations and review processes, such as the subdivision of land regulations. S E A recommends that the Town work towards a more comprehensive review process and enact regulations to require stormwater management in all new developments and in the redevelopment of existing properties.

The recommendations are based on three objectives. The first is a goal of applying the MA-DEP Stormwater Policy to all development and redevelopment in Westminster. Currently, the DEP Policy is applied to activities under the revised subdivision regulations and the new site plan approval regulations. The second objective is compliance with specific requirements of the NPDES Phase II Stormwater Management Plan. The Town has been working with their consultant, Brown and Caldwell to achieve compliance with their NPDES plan. Efforts have been completed to satisfy several of the permit requirements and more activities are underway. The Town also obtained a grant from the Executive Office of Environmental Affairs to assist in developing a draft bylaw for Low Impact Development (LID) to manage growth and protect natural resources in Town. The Wachusett Working Landscapes Partnership is providing technical guidance to the Westminster Stormwater Committee to develop the draft bylaw. Therefore, these recommendations should be considered in conjunction with current activities to enhance stormwater management in Town.

Developing and enacting regulations is a lengthy process, especially when dealing with a relatively new regulatory concept for communities such as stormwater management. Westminster is a small town with fewer administrative staff and smaller sized municipal departments. Therefore, the increased administrative effort and necessary oversight resulting from additional management controls can easily become an overwhelming burden to the Town. Westminster should hold a stormwater management workshop that includes all Town departments to evaluate these recommendations and appropriately understand the additional impacts to each department. An implementation schedule should be developed during the workshop that focuses on completing the recommendations that are the highest priority for the Town and those that are also requirements of the NPDES plan. A goal for the Town should be to implement these recommendations in phases within the first 10-years of the CWMP planning period. NPDES requirements contained in these recommendations should adhere to the implementation schedule in the Town's NPDES plan.

1. In order to regulate stormwater for development that does not fall under the jurisdiction of the Planning Board, the zoning regulations should be amended to require a Stormwater Management Permit for all new development and redevelopment within Westminster. This could be achieved by making all uses subject to a stormwater permit or by creating a Stormwater Management District similar to the Flood Plain District. Permits would be issued by the Planning Board for development under its jurisdiction, and likewise by the Building Inspector for development that is not subject to Planning Board review. Permit requirements should be based on the nine Stormwater Management Standards of the MA-DEP Stormwater Policy and specific requirements will vary by type and extent of development. Minimum requirements of the permit should include the following:

    - For new single-family residential development (typically reviewed by the Building Inspector): A Stormwater Management Permit shall be required for construction of all single family homes not included as part of a subdivision for which a Permit has been issued. The goal shall be to mitigate stormwater impacts pertaining to runoff, infiltration, and water quality to the maximum extent feasible. To meet that goal, all roof runoff shall be diverted to an infiltration or recycling system. Driveways shall be graded away from public roadways and storm drains to promote infiltration either over land or through infiltration systems. When infiltration systems are used for driveway runoff, pretreatment units shall be employed. Proposed sump pump discharges shall be diverted to infiltration systems.

    - For single-family residential redevelopment (typically reviewed by the Building Inspector): A Stormwater Management Permit shall be required if the proposed addition or alteration increases the total impervious area on a lot by 10-percent, increases the total living space of the residence by 30-percent, or increases the total value of the property by 50-percent, whichever is less. The goal shall be to mitigate stormwater impacts pertaining to runoff, infiltration, and water quality to the maximum extent feasible compared to pre-development conditions. To meet that goal, all roof runoff shall be diverted to an infiltration or recycling system. Whenever possible, driveways shall be graded away from public roadways and storm drains to promote infiltration either over land or through infiltration systems. When infiltration systems are used for driveway runoff, pretreatment units shall be employed. Existing or proposed sump pump discharges shall be diverted to infiltration systems.

    - The 2004 revisions to the subdivision regulations contain requirements for treatment and recharge of stormwater to the maximum extent feasible. Consequently, no further recommendations are provided with respect to subdivisions.

- For new commercial/industrial development (typically reviewed by the Planning Board): A Stormwater Management Permit shall be required with the goal to mitigate 100-percent of stormwater impacts pertaining to runoff, infiltration, and water quality. To meet that goal, all roof runoff shall be diverted to infiltration or recycling systems. Runoff from other pervious and impervious surfaces shall be captured, treated, and infiltrated to meet the mitigation goal. Should on-site facilities fail to cost-effectively provide adequate infiltration capacity, the proponent may elect to provide stormwater mitigation at off-site locations to provide infiltration and attenuate runoff from existing development in Westminster.

- For commercial/industrial redevelopment (typically reviewed by the Planning Board): A Stormwater Management Permit shall be required with the goal to mitigate stormwater impacts pertaining to runoff, infiltration, and water quality to the maximum extent feasible compared to pre-development conditions. To meet that goal, all roof runoff shall be diverted to infiltration or recycling systems. Runoff from other pervious and impervious surfaces shall be captured, treated, and infiltrated where feasible to meet the mitigation goal.

For all Stormwater Management Permits, the goal shall be maximum feasible compliance with the above detailed requirements. The issuing authority shall use its best judgment in the review of submitted information to determine if full compliance with the requirements would constitute a hardship for the property owner. The Stormwater Management Permit should require the use of post-construction runoff controls, which include the use of structural BMPs and standards for long-term maintenance. The 2004 revisions to the subdivision regulations provide some detail regarding BMPs that can be used for post-construction runoff control. The Town could also reference the MA-DEP Stormwater Policy *Stormwater Technical Handbook* for selection of BMPs as guidance for developers.

The Stormwater Management Permit should include an inspection program similar to that required in the subdivision regulations. It should be enhanced to include coordination between applicable Town departments and should include regular inspection of on-going construction activities in the Town. The program should ensure sedimentation and erosion control measures are being utilized during the construction period, and include sanctions to guarantee compliance. Specific criteria for these controls should be included with the issued permits for construction as an order of the Stormwater Management Permit. The program should consider a schedule to visit a percentage of active construction sites on a monthly basis by a representative of the appropriate Town department. Documentation of the visit will be recorded, including any potential problems with the site or non-compliance.

2. The Flood Plain District established by the zoning regulations should be modified to prohibit stockpiling and disposal of snow and ice containing sand and deicing chemicals. This recommendation should be coordinated with the development of DPW operation and maintenance practices, to identify the most suitable locations for snow stockpiling.

3. The site plan review process includes requirements for applicants to evaluate methods for reducing erosion and sedimentation, water quality impacts, and stormwater runoff. As part of the site review process, the DPW or its designee should evaluate proposed structural BMPs from an operations and maintenance perspective.

4. The Westminster Stormwater Committee is currently preparing a regulation to prohibit non-stormwater discharges to the Town storm drain systems. The regulation should include appropriate enforcement procedures. In addition, Town of Westminster regulations should prohibit stormwater discharges from properties onto adjacent sidewalks and streets.

5. The subdivision rules and regulations or the Conservation Commission regulations should address dewatering operations occurring on-site or off-site as a result of construction. Proposed requirements could require dewatering operations to make use of settling basins and/or filters to remove silt and sediment before release into resource areas and should prohibit dewatering directly into catch basins. Provisions exempting emergency repairs from those requirements should be included in the revisions.

6. There are a number of other stormwater management controls that are required by the NPDES Phase II plan that must be eventually addressed by the Town. These controls are summarized as follows:

    - Regulations should include a procedure for receipt and consideration of information submitted by the public regarding local construction activities. The information may include public inquiries and concerns, which would be received by an appropriate representative and directed to the proper Town department or the site inspector for follow-up.

    - The DPW should develop and implement a program for monitoring the performance and condition of BMPs post-construction. This practice should include site visits and inspections of the systems used to ensure they are functioning as intended.

    - The DPW should work with the appropriate Town departments to establish a funding mechanism to support operation and maintenance of structural BMPs.

These recommendations establish local regulatory mechanisms to reduce future impacts to stormwater resulting from development and to create mitigation for impacts to stormwater that resulted from past development. Although there is a moderate cost to the Town to develop and administer these measures, the bulk of the cost associated with constructing the mitigation facilities will be born by large developers, and can be considered the cost of responsible development in a stressed watershed.

6.8 Conclusions

The recommendations presented above include both management actions required by the NPDES Phase II program and additional actions that could be undertaken as part of the overall CWMP to improve water quality and quantity in Westminster and its surrounding environment.

Table 6.3
Stormwater Best Management Practices

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7. Wastewater Management Alternatives Analysis

7.1 Introduction

Previous chapters of the CWMP examined existing environmental and built conditions in Westminster and identified areas within Town that appear in need of improved wastewater management. The Wastewater Management Alternatives Analysis evaluates wastewater management options to meet Westminster's wastewater needs. The purpose of the Wastewater Alternatives Analysis is to identify the most advantageous management strategies for needs areas that also meet the goals of the CWMP.

In addition to improving wastewater management in the Town of Westminster, the CWMP strives to minimize impacts to the Nashua River Basin. Therefore, the alternatives analysis will include an evaluation of the impacts on water balance in the watershed for each wastewater management option considered.

The first section of this chapter provides an overview of various wastewater management options. The second section locates and screens potential sites for wastewater treatment and disposal facilities. The following sections detail the methodology and screening of various on-site, cluster, centralized, and regional alternatives for the Town's needs areas. The final sections provide detailed analysis of alternatives and conclusions for needs areas and summarize the conclusions of the Wastewater Alternatives Analysis.

7.2 Overview of Wastewater Management Approaches

Several different types of wastewater management options are available for consideration. A wastewater management approach denotes an overall classification of an option. Treatment and disposal approaches include on-site, cluster, centralized, and regional solutions. On-Site solutions include individual conventional Title 5 systems and individual Innovative/Alternative (I/A) systems through which each user has a treatment and disposal system located on the site where the wastewater is generated. Cluster or satellite solutions are slightly larger versions of on-site systems where wastewater from a small number of individual generators is conveyed to a common nearby location for treatment and disposal. Centralized solutions consist of in-town facilities intended to treat and dispose of significant wastewater volumes from large portions of Westminster. A centralized facility could range in size from a small facility to serve a particular section of Town to a large facility to serve not only Westminster, but also a portion of a neighboring community. Regional solutions consist of connecting to existing major wastewater facilities located outside of Westminster.

Both regional and centralized approaches are types of centralized solutions since wastewater is conveyed away from the generators, and is treated and discharged to a separate, centralized location. For Westminster, a regional approach could discharge to the City of Fitchburg or City of Gardner sewer systems. The Fitchburg treatment plant discharges treated wastewater to the North Nashua River. This branch of the Nashua River is located in a separate river sub-basin than those within Westminster. Therefore, this approach would create an imbalance between the location of water withdrawal and wastewater discharge. Depending on the location of the treatment facility, the centralized approach might also direct the wastewater discharge to a different Nashua River Sub-Basin than the water withdrawal location. Conversely, both on-site and cluster approaches can be categorized as localized solutions since the wastewater treatment and disposal would take place very close to the water withdrawal location.

A wastewater management technology denotes a specific method of an approach. For example, a FAST® system is a technology that could be used where an advanced on-site approach is required. Although an overview of specific technologies will be provided for informational purposes, the focus of the CWMP

will be to develop preferred wastewater management approaches for the needs areas in Westminster. The implementation of management approaches can vary significantly. The subsequent sections of this chapter detail how these management approaches can be applied to the Town.

7.2.1 System Components Overview

Wastewater management systems generally include four major components: collection, treatment, effluent disposal, and residuals management. Collection systems convey wastewater from the generator (e.g. a residence) to a location for treatment. Treatment systems remove organic materials, nutrients, and other contaminants from wastewater. Effluent disposal systems reintegrate the treated wastewater with the environment. Residuals management systems dispose of the concentrated contaminants that were removed from the wastewater. Various technologies have been developed for each of these components. Combining these elements creates complete wastewater management systems such as on-site, cluster, centralized, and regional approaches.

7.2.1.1 On-Site Systems

On-site systems do not require a major collection component because, as the name indicates, the treatment and disposal components are located at the same site as the wastewater generation. The septic tank and leaching field provide the treatment component for conventional Title 5 on-site systems, as detailed in Chapter 2 of this report. Conventional leaching trenches, fields or pits, and newer plastic leaching chambers can provide the effluent disposal component of an on-site system. Septage hauling is virtually the only practical option for residuals management for on-site systems. Figure 7-1 below illustrates how technologies from each of the component categories can be combined to provide an on-site wastewater solution.

Figure 7-1
On-Site Wastewater Management Solution

The cost to install a new conventional on-site system (Title 5 subsurface disposal system) generally ranges between $10,000 and $25,000, based on site conditions (2006 dollars). The only regular maintenance requirement is the cost to pump out the septic tank, which is typically $150 to $250, and should be done every three to five years.

7.2.1.1.1 On-Site System Technologies

I/A treatment technologies, such as the Bioclere™ or Cromaglass™ systems can fulfill the treatment component of on-site systems where site limitations require superior treatment. There are many I/A technologies approved by the Massachusetts DEP for use in on-site applications. S E A has previously investigated approved I/A technologies and evaluated them based on cost, installation difficulty, operational constraints, and maintenance requirements. The most favorable systems include Single Home

FAST®, JET® Aerobic Treatment System, and Norweco Singulair. Other systems include JET® Aerobic Tertiary Sand Filter, Saneco Intermittent Sand Filter, Cromaglass™, and Bioclere™. Details regarding specific I/A systems in use in Westminster are provided in the Existing Wastewater Management narrative (Chapter 2) of this report.

The following summary provides descriptions of several favorable I/A technologies including unit process, structural components, Title 5 variances, maintenance, and cost. More detailed information about I/A technologies and the MA-DEP I/A technology program can be located at the following internet address: http://www.mass.gov/dep/water/wastewater/t5itprog.htm

The MA-DEP requires that all I/A technologies have a pressure dosed Soil Absorption System (SAS). Therefore, there is an operational cost associated with every I/A technology. The annual cost to operate the pump that delivers effluent to the SAS, for a typical three bedroom home, is generally less than $50 per year (2006 dollars). However, the estimated pump replacement cost can range between $2,000 and $2,500 dollars.

Single Home Fixed Activated Sludge Treatment (FAST®) and Micro FAST® Systems

The Single Home and Micro FAST® Systems were developed by Bio-Microbics, Inc. The treatment system is an aerated submerged media bed installed in a second compartment of the septic tank. Solids settle in the first section of the tank and the wastewater overflows into the next section of the tank for treatment. Approximately 20-percent of the nitrified wastewater is returned to the first section of the tank where anaerobic conditions and carbon from the solids in the raw wastewater combine to denitrify returned wastewater. Nitrate levels are reduced to below 10 mg/l. Effluent from the system enters a pump chamber, where it is pumped to the SAS.

The difference in the two FAST® Systems is the maximum design flow approved by the MA-DEP. The Micro FAST® System is approved for a maximum design flow of 440 gpd, while the Single Home FAST® System is approved for a maximum design flow of 550 gpd. The system components include a blower with a housing cover and a vent pipe. The blower supplies oxygen to the media, and also circulates the wastewater through the media. The septic tank has a baffle to separate the primary and secondary chambers and the treatment unit is installed in the secondary chamber. A pump is required to deliver effluent to the SAS.

Under Title 5 regulations, these systems can be used in soils with a percolation rate of 60 to 90 minutes per inch (mpi) with a loading rate of 0.15 gpd per sq. ft. The SAS can be designed with a 50-percent reduction of the leaching field area or a 2-foot reduction of the required groundwater separation or a 2-foot reduction of the requirement for four feet of naturally occurring soil.

The pump out frequency of these systems is the same as a conventional on-site system, which is once every three to five years. Other necessary maintenance includes checking the blower to ensure that it is operating properly, monitoring the sludge level in the tank, and checking the effluent pump. The MA-DEP requires that the FAST® System be under a maintenance agreement throughout its life. No maintenance agreement can be for less than one year. The MA-DEP also requires quarterly testing of the effluent for the first year the system is in use. After the first year, the owner of the system may file with the local Board of Health for permission to stop testing.

The total estimated installation cost for either a Single Home FAST® or a Micro FAST® System is between $20,000 and $30,000, depending on site conditions (2006 dollars). A yearly maintenance agreement costs $300 to $500 per year. Testing costs $600 per year ($150 per visit for four visits). The blower must operate 24-hours a day; therefore, the cost to operate the blower and the pump is estimated to be between $200 and $300 per year.

JET® Individual Home Aerobic Wastewater Treatment System

The JET® individual home aerobic wastewater treatment plant, manufactured by JET, Inc., is an aerobic wastewater treatment system that uses a primary settling zone, aerobic treatment zone, and a secondary clarifying zone to treat wastewater. Solids settle in the primary chamber. In the aerobic zone, a fixed media encourages the growth of bacteria which treat the incoming wastewater. Aerobic conditions are maintained by an aspirator which mixes and disperses fine air bubbles through the aerobic zone. Clear effluent is produced in the final clarifying zone where solids are settled back into the aeration zone. Effluent from the system is discharged by a pump to the SAS. The system is approved for a maximum design flow of up 450 gpd.

The JET® Aerobic System is delivered as a pre-cast unit and constructed below grade. A conventional septic tank is not needed with this system, but a SAS is required. Since the unit does not require the installation of a separate septic tank, this technology is favorable in small lots with space constraints. The system includes a blower and an effluent pump.

Under Title 5 regulations, this system can be used in soils with a percolation rate of 60 to 90 mpi with a loading rate of 0.15 gpd per sq. ft. The SAS can be designed with a 50-percent reduction of the leaching field area or a 2-foot reduction of the required groundwater separation or a 2-foot reduction of the requirement for four feet of naturally occurring soil.

The pump out frequency of this system is the same as a conventional on-site system, which is once every three to five years. Other necessary maintenance includes checking the blower to ensure that it is operating properly, monitoring the sludge level in the tank, and checking the effluent pump. The maintenance agreement cannot be for less than one year. Effluent testing is required by MA-DEP for the first year after installation of the system. After the first year, the owner of the system may file with the local Board of Health for permission to stop testing.

The estimated installation, maintenance agreement, and testing costs for the JET® Model J-353 System are similar to those for the FAST® System. This system includes both a blower and a pump; therefore, the estimated operational costs are also similar to the to FAST® System.

Norweco Singulair

Singulair Bio-Kinetic wastewater treatment system, developed by Siegmund Environmental Services, Inc., is a package system which uses added air to aerobically treat domestic wastewater. The process is similar to the JET® system whereby wastewater enters the system and the treatment process takes place in a three compartment pre-cast concrete tank. The initial chamber removes solids from the wastewater by settling. The wastewater is then treated in a second chamber to which air is added to mix and aerate the liquid and promote aerobic digestion. The third chamber contains the Bio-Kinetic unit which promotes additional filtration and settling.

Under Title 5 regulations, this system can be used in soils with a percolation rate of 60 to 90 mpi with a loading rate of 0.15 gpd per sq. ft. The SAS can be designed with a 50-percent reduction of the leaching field area or a 2-foot reduction of the required groundwater separation or a 2-foot reduction of the requirement for four feet of naturally occurring soil.

The pump out frequency of this system is the same as a conventional on-site system. Other necessary maintenance includes checking the blower to ensure that it is operating properly, monitoring the sludge level in the tank, and checking the effluent pump. The maintenance agreement cannot be for less than one year. Effluent testing is required by MA-DEP for the first year after installation of the system.

The estimated installation, maintenance agreement, and testing costs for the Norweco Singulair System are similar to those for the FAST® System. This system includes both a blower and a pump; therefore, the estimated operational costs are also similar to the to FAST® System.

7.2.1.2 Cluster Systems

Cluster solutions are basically large versions of on-site systems where wastewater from a small number of generators is treated and disposed. Cluster solutions require small collection systems, but otherwise the character of the treatment, effluent disposal, and residuals management components is similar to on-site systems. Cluster systems would be an effective approach to serve a neighborhood of homes that are located on adequate Title 5 soil, but have small lots. The homes are recognized as being in a needs area because each individual lot is not large enough to site an adequate Title 5 System. A vacant lot near the area could accommodate an I/A system that would be sized to treat the wastewater from the homes in the needs area. This option would recharge the aquifer in the needs area, while solving the Title 5 problems of individual homeowners.

The Westminster Board of Health regulations stipulate that on-site systems must be located on the same lot as the buildings they serve, thereby not allowing cluster systems in Town. The MA-DEP considers a cluster system as a shared system. Before a shared system is allowed to go online, the MA-DEP requires that ownership be determined to ensure that the system will be properly maintained. Therefore, when a cluster system is implemented by private users, extensive legal procedures may be required by MA-DEP to assign ownership of a common system among multiple users. The cluster approach as presented in this CWMP would be implemented and owned by the Town instead of private users to improve wastewater management. Therefore, Westminster would assume administration of this approach and changes to local regulations would not be necessary.

Subsequent sections of the alternatives analysis explore the on-site and cluster possibilities in Westminster, and assess those possibilities against screening criteria to help discern the locations in Town where on-site and cluster solutions are viable. Since the cluster approach would also require siting and constructing treatment and effluent disposal facilities, Section 7.3 screens potential sites for such facilities within Westminster. Subsequent sections detail the characteristics, attributes, components, requirements and general costs of specific on-site and cluster treatment and effluent disposal technologies.

7.2.1.2.1 Cluster System Technologies

Many of the I/A technologies that were discussed for on-site treatment may be used for larger design flows where site limitations exist. The most favorable treatment technologies for use in cluster system applications include Modular FAST®, Cromaglass™, and Norweco Modulair. The Bioclere™ system is moderately favorable. The following summary details how an I/A technology could be utilized in a cluster system application.

<u>Cromaglass™ Wastewater Treatment System</u>

The Cromaglass™ System is available in several models that treat design flows between 500 gpd and 12,000 gpd. Larger design flows up to 200,000 gpd can be accomplished by installing multiple Cromaglass™ units. The system consists of a Sequencing Batch Reactor (SBR) technology that has been used in numerous applications worldwide.

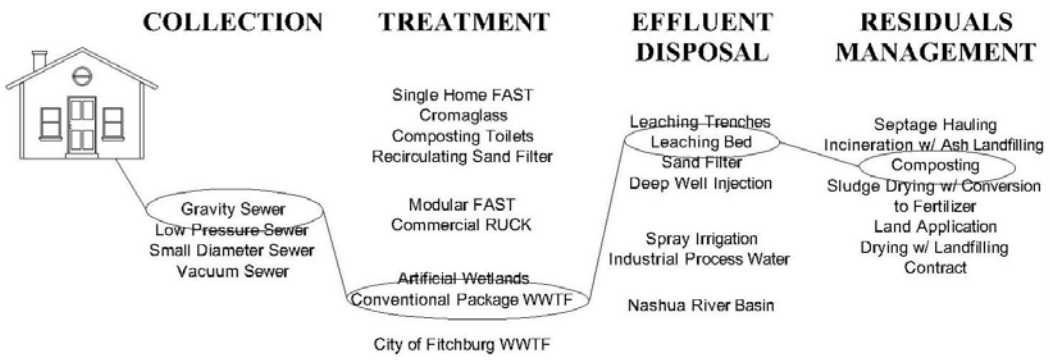
The Cromaglass™ System is MA-DEP certified for General Use when used in conjunction with an otherwise fully complying Title 5 System. The system allows reduction in the size of the SAS by up to 67-percent.

The estimated construction cost for a Cromaglass™ System with a design flow of 10,000 gpd is approximately $600,000, depending on site conditions (2006 dollars). This estimate does not include the cost of transporting the wastewater from the homes to the satellite site. A system of this size would need to be maintained by a Massachusetts registered wastewater treatment plant operator on a schedule determined by MA-DEP.

7.2.1.3 Centralized Systems

A centralized treatment and disposal approach for Westminster that serves several areas of Town would require an extensive collection component. Collection system technologies have evolved significantly over the past few decades. Typical collection system components now include gravity sewer, low-pressure sewer, vacuum sewer, pump stations, and force mains. Application of specific collection system components depend on local physical conditions, construction costs, and long-term operations costs. Since the centralized approach would also require siting and constructing large-scale treatment and effluent disposal facilities in Westminster, Section 7.3 screens potential sites for such facilities within Town. The technologies available to treat and dispose large volumes of wastewater are briefly described below, and the residuals management component of an overall centralized treatment solution would need to be explored in depth in the final phases of the CWMP should that approach be adopted. Figure 7-2 below illustrates how technologies from each of the component categories can be combined to provide a centralized wastewater solution.

Figure 7-2
Centralized Wastewater Management Solution



7.2.1.3.1 Centralized Treatment Technologies

Most conventional wastewater treatment facilities incorporate several different units that remove certain contaminants from wastewater. The headworks of a treatment facility screens out large debris and material. Primary clarifiers typically use gravity settling to remove settleable solids from wastewater. Secondary processes typically employ biological processes to remove organic material from wastewater. Tertiary processes typically remove residual organic materials and nutrients. The final stage of treatment typically includes disinfection of the effluent prior to discharge to either surface waters or groundwater discharge basins. Removal of nutrients, particularly nitrogen-based nutrients, will most likely be a requirement of any centralized treatment facility in Westminster. Technologies that remove both organic materials and nutrients have improved significantly over the past few decades as treatment processes have evolved. The four processes described below have gained particular support for use in communities such as Westminster.

- RBC - Rotating Biological Contactor. This process uses a biomass adhered to a rotating medium to treat the wastewater. The cylinders are generally half-submerged in the wastewater, and the

rotating creates mechanical aeration to sustain the aerobic processes. The modified version of the RBC is submerged deeper creating a more anoxic condition to reduce more nitrogen. Operation of RBCs can prove to be challenging, particularly if the chemical constituents of the wastewater change over time.

- SBR - Sequencing Batch Reactor. This process combines the aeration process and the clarifier process into one tank in lieu of two separate tanks constructed in series. Wastewater flows into the tank; aerators are turned on and then turned off to allow quiescent settling. The clarified effluent is subsequently decanted, and the process starts over again. SBRs can provide a very cost-effective approach to wastewater treatment.

- MLE - Modified Ludzack Ettiger. This process incorporates an anoxic zone to reduce total nitrogen and an aerobic zone to reduce Biochemical Oxygen Demand (BOD) and ammonia. The system uses extensive recycling of wastewater to balance the food for the different kinds of microorganisms that digest contaminants in wastewater.

- Bardonpho – This process is a multi-stage MLE process.

The capacity of centralized systems is generally very large; therefore, typical groundwater disposal of treated wastewater effluent requires significant land area. Geological conditions must be very favorable to support a large groundwater discharge. Groundwater injection wells are an alternative effluent disposal technology to traditional leaching areas. Highly treated effluent is pumped into an injection well, which discharges to groundwater. There are not many injection wells currently in use in Massachusetts, as they are a relatively new concept for this use and they require highly transmissive sites that will not have negative impacts to sensitive resources. There is also a serious concern that if the treated effluent is not of exceptional quality, the nutrient levels in the effluent can cause growth of biofilm on the well screen and surrounding material. This effect can significantly reduce the capacity of the well over time.

7.2.1.3.2 Water Reuse

Another wastewater disposal option available to Westminster is water reuse. Water reuse is the practice of providing advanced treatment to wastewater so that it can be reused for certain purposes. MA-DEP encourages water reuse for various applications that are not likely to threaten public health, which include spray irrigation of golf courses, landscaping, artificial recharge of aquifers in certain situations, and toilet flushing. The *Reclaimed Water Use Interim Guidance* issued by MA-DEP in 1999 (revised 2000) outlines the regulatory approach to these potential water reuse options. The guidance is intended to be a "dynamic working guidance" to facilitate the review of alternative, innovative means of wastewater reuse or disposal (MA-DEP 1999).

Potential applications for water reuse exist in Westminster. There are two golf courses located in Town. The Westminster Country Club is located at 51 Ellis Road, near Town center, at the current extent of the municipal sewer system. The Woods of Westminster golf course is located in the northeastern portion of Town. Aquifer recharge would be a beneficial application for water reuse in Town since the Nashua River Basin is a stressed basin. Public water supply in Westminster is obtained from surface water bodies located in Town; therefore, an aquifer recharge project must consider the hydrology and hydrogeology in Town and not degrade the water quality of those resources. In addition to these possibilities, the presence of significant industry in Westminster presents the Town with an opportunity to sell non-potable water for industrial processes. Industries may also consider initiating water reuse projects for landscaping and toilet flushing applications. For any reuse option, wastewater would need to be treated to an exceptionally high level, and alternate disposal means would need to be provided. Alternate disposal

means are necessary since the water re-use application may be seasonal, such as spray irrigation, or in the event that it is suspended or eliminated.

7.2.1.4 Regional Systems

A regional treatment and disposal approach might also require an extensive collection component, including possible construction of interceptor sewers to connect the needs areas with available regional treatment facilities. Regional treatment options include utilizing existing wastewater treatment facilities located in neighboring municipalities. The regional approach would combine treatment, effluent disposal, and residuals management into one package. Subsequent sections investigate the regional alternative for Westminster.

7.2.1.5 Town-Wide Management

The overall, town-wide management plan recommended at the conclusion of the CWMP efforts may include elements from all the different approaches, and may include several different specific technologies detailed in the alternatives analysis. Subsequent sections of this chapter will evaluate the feasibility and impacts of each approach for each needs area to identify the most appropriate wastewater management approach for needs areas within Westminster.

7.2.2 Environmental Permitting Requirements

Permitting requirements will vary depending upon the sites and technologies selected. In general, the complexity of the permitting process is likely to increase proportionately with the flow volume and the distance between the generator and the treatment facility. The major permits and approvals, and their applicability to each of the four proposed approaches, are discussed below.

Tables 7.1A through 7.1D include the major environmental permits likely to be associated with the four proposed approaches. The Town may need to obtain additional permits, such as those governing disposal of construction debris or hazardous waste. It was assumed that on-site systems would be privately-owned, cluster and centralized systems would be municipally owned, and the in-town collection system associated with the regional approach would be municipally owned. Effluent permits for regional solutions are not specified here since they are obtained by facility owner/operators. Typical applicability triggers are listed. Projects may be exempt depending upon the solution selected. Data for Title 5 permits apply to remediation of failed on-site and shared systems at current flow rates, not to new construction or increased flow.

7.2.2.1 On-Site Approach

Of the four proposed approaches, the on-site approach is anticipated to be the simplest and fastest to permit. It involves minimal investment of Town resources and presents no change in current operations. The Board of Health would continue to review and approve permit applications for new systems and for repairs to existing systems. To monitor on-site system compliance and maintenance, the Board might choose to adopt a comprehensive on-site system management plan. To reduce homeowner costs and increase system maintenance, the Town may wish to establish a local or regional district for transport and disposal of septage pursuant to Title 5 of the Massachusetts Environmental Code. The on-site approach is unlikely to require significant activity by other Town departments or compliance with non-wastewater regulations. The on-site approach and potential enhancements to the approach are evaluated further within this chapter.

Table 7.1A
On-site Permitting Requirements

Program/Permit	Applicability	Regulatory Authority
Title 5 of the Massachusetts Environmental Code:	Subsurface sewage disposal for new systems with a design flow of < 10,000 gpd, or upgrades to existing systems with a design flow of < 15,000 gpd.	310 CMR 15.00
• Disposal System Construction Permit	Construction of on-site or cluster systems.	
• Local Upgrade Approval		
• Variances	DEP approval may be required.	
Groundwater Discharge Permit	Discharge of > 10,000 gpd of effluent to the ground for new systems.	314 CMR 5.00
Order of Conditions Wetlands Protection Act Rivers Protection Act	Disturbance or alteration of wetlands, waterways, or wildlife habitat.	310 CMR 10.00

Upgrading failing on-site systems with design flows of 10,000 gallons per day (gpd) or less is relatively straightforward. After obtaining a Disposal System Construction Permit from the Board of Health, generators (typically homeowners) may construct conventional on-site systems or I/A systems approved for remedial use.

If construction of such a system will not result in compliance with Title 5 regulations, the Board of Health may approve a Local Upgrade Approval or a variance. Both Board of Health and MA-DEP approval is necessary for installation of remedial systems requiring more than one setback variance (e.g., a reduction in both separation to groundwater and the size of the leaching field), and for installation of pilot systems and systems which have provisional approval. Groundwater discharge permits are now required for new systems with design flows greater than 10,000 gpd, as the former 15,000 gpd threshold was recently reduced by MA-DEP. Upgrades to existing on-site systems with design flows greater than 15,000 gpd require a groundwater discharge permit as well.

While the burden would be on system owners and operators to bring failing systems into compliance, until the majority of failing systems have been upgraded, the on-site approach could necessitate an increase in the Board of Health's level of effort to review and approve applications.

7.2.2.2 Cluster Approach

Since satellite systems are currently prohibited in Westminster, the only management option for implementation of the cluster approach is through Town resources. Therefore, the burden of design, permitting, and financing the cluster approach would fall to the Board of Health, DPW, and other Town departments. Since the Town would own the system, the Board and/or DPW would ultimately be responsible for operation and maintenance of the facility, including permit compliance, even if day-to-day management were contracted out to a private operator.

If Board of Health regulations were modified to allow these types of systems in Town, then a cluster approach could be implemented by private entities, such as businesses or condominium associations. Ownership and requirements would be the responsibility of the private entity. This option is much more attractive for the Town considering the Board of Health, DPW, and Water & Sewer Department already have considerable responsibilities. However, this option may present risk if the entity were to discontinue

operations for financial reasons. Potential use of the cluster approach in Westminster is evaluated further within Section 7.8 of this chapter.

Table 7.1B
Cluster Permitting Requirements

Program/Permit	Applicability	Regulatory Authority
Title 5 of the Massachusetts Environmental Code:	Subsurface sewage disposal for new systems with a design flow of < 10,000 gpd, or upgrades to existing systems with a design flow of < 15,000 gpd.	310 CMR 15.00
• Disposal System Construction Permit	Construction of on-site or cluster systems.	
• Local Approval Upgrade		
• Variances	DEP approval may be required.	
• Use of Shared Systems	DEP approval is required.	
Groundwater Discharge Permit	Discharge of > 10,000 gpd of effluent to the ground for new systems or for a cluster shared system.	314 CMR 5.00
DEP Site Hearing	Acquisition and use of treatment facility site.	314 CMR 12.00
Land Application of Septage		310 CMR 32.00
Sewer Connection or Extension Permit	Flow > 15,000 gpd or construction of pumping station or sewer extension of any length.	314 CMR 7.00
Order of Conditions Wetlands Protection Act Rivers Protection Act	Disturbance or alteration of wetlands, waterways, or wildlife habitat.	310 CMR 10.00
Chapter 91 Waterways License Public Waterfront Act	Disturbance or alteration of waterways or flowed or filled tidelands.	310 CMR 9.00
Historic Preservation	Site disturbance, demolition, or alteration of structures or archeological sites listed or eligible for listing on the Massachusetts or National Registers of Historic Places or Archeological Sites.	950 CMR 71.00
Natural Heritage and Endangered Species Program	Work that may affect endangered or threatened species or their habitat.	321 CMR 10.00
MEPA ENF/EIR Massachusetts Environmental Policy Act	Sewer construction, disturbance of wetlands above threshold levels.	301 CMR 11.00

Assuming the design flow is less than 10,000 gpd, the Disposal System Construction Permit and Local Upgrade Approval requirements would be similar to those for on-site systems under the jurisdiction of Title 5. However, for discharges in excess of 10,000 gpd, a groundwater discharge permit would be required. In addition, a Sewer Extension Permit would be required for construction of any sewers and pump stations.

Both MA-DEP and the Board of Health must approve the use of cluster systems. The application for use of a cluster system must include:

- A proposed operation and maintenance plan.

- A description of the form of ownership which any component of the system serving more than one building or dwelling will take, together with relevant legal documentation. A description of the financial assurance mechanism proposed to ensure effective long-term operation and maintenance of the system, such as a proposed insurance policy naming the Board of Health and MA-DEP as additional insured's.

- A copy of a proposed Grant of Title 5 Covenant and Easement.

Although the MA-DEP provides sample documents, preparation and review of these documents would require substantial effort by Town Counsel and the involvement of various Town departments. Prolonged negotiations between property owners could delay construction and thus compliance with Title 5 regulations.

If a site for the system must be acquired, the Town would be obliged to complete the MA-DEP Site Hearing process, largely a formality. The Board of Health and/or MA-DEP would also need to approve residuals disposal plans.

The construction of sewers increases the likelihood that non-wastewater permits would be required, primarily waterways and wetlands related. An Order of Conditions from the Conservation Commission would be required if the site is within areas subject to protection under the Wetlands Protection Act or the Rivers Protection Act. If the selected site is within an area subject to protection under the Natural Heritage and Endangered Species Program, approval by the Program will also be required. There is some potential for sewer construction associated with the cluster approach to necessitate review by the Westminster or Massachusetts Historical Commission, the U.S. Army Corps of Engineers, and other agencies.

7.2.2.3 Centralized Approach

The centralized approach applies to larger areas of Town than the cluster approach; therefore, the treated discharge volume is anticipated to be significant. The Town would need to invest significant resources to implement a centralized approach. The Town would most likely be responsible for design, permitting, financing, operations and maintenance, and permit compliance.

The Town would need to obtain a sewer extension permit for the collection system. In this context, "extension" includes the construction of new sewer pipe of any length that does not connect to a Title 5 system. A groundwater discharge permit would be required since the discharge volume would exceed 10,000 gpd. Acquisition of a site for the facility would trigger the MA-DEP Site Hearing process.

If the selected recharge site is within an area subject to protection under the Natural Heritage and Endangered Species Program, approval by the Program will be required. An Order of Conditions from the Conservation Commission will be required if the site is within areas subject protection under the Wetlands Protection Act or the Rivers Protection Act. Extensive sewer construction associated with the centralized approach is more likely to necessitate review by the Westminster or Massachusetts Historical Commission, the U.S. Army Corps of Engineers, and other agencies. Potential use of the centralized approach is evaluated further within this chapter.

Table 7.1C
Centralized Permitting Requirements

Program/Permit	Applicability	Regulatory Authority
Groundwater Discharge Permit	New discharge of > 10,000 gpd of effluent to the ground.	314 CMR 5.00
DEP Site Hearing	Acquisition and use of treatment facility site.	314 CMR 12.00
Land Application of Septage		310 CMR 32.00
Sewer Connection or Extension Permit	Flow > 15,000 gpd or construction of pumping station or sewers of any length.	314 CMR 7.00
NPDES Permit	Discharge of pollutants to surface waters.	33 CFR 1251 et sec.
Surface Water Discharge Permit State NPDES	Discharge of pollutants to surface waters.	314 CMR 1.00 - 4.00
Order of Conditions Wetlands Protection Act Rivers Protection Act	Disturbance or alteration of wetlands, waterways, or wildlife habitat.	310 CMR 10.00
Chapter 91 Waterways License Public Waterfront Act	Disturbance or alteration of waterways or flowed or filled tidelands.	310 CMR 9.00
Historic Preservation	Site disturbance, demolition, or alteration of structures or archeological sites listed or eligible for listing on the Massachusetts or National Registers of Historic Places or Archeological Sites.	950 CMR 71.00
Natural Heritage and Endangered Species Program	Work that may affect endangered or threatened species or their habitat.	321 CMR 10.00
U.S. Army Corps Section 404 of the Clean Water Act Section 10 of the Rivers and Harbors Act of 1899	Water diversion; disturbance of > 5,000 s.f. of wetlands; waterways and/or wetlands fill and secondary impacts.	33 CFR 1251, et seq.
Water Quality Certification (WQC) Section 401 of the Clean Water Act	Discharge to surface waters involving disturbance of wetlands or land under water. If no WQC thresholds are exceeded but the project requires Category II review by the Army Corps, the Army Corps may allow the Order of Conditions to serve as the WQC. Required if an Individual Section 404 permit is required.	314 CMR 9.00
MEPA ENF/EIR Massachusetts Environmental Policy Act	Sewer construction, treatment facility construction, disturbance of wetlands above threshold levels.	301 CMR 11.00

7.2.2.4 Regional Approach

Wastewater and non-wastewater permit requirements for the regional approach would likely be similar to those for construction of the sewer system for the centralized approach. The regional approach is currently available to the Town through the City of Fitchburg sewer system and through the City of Gardner sewer system. Potential use of the regional approach is evaluated further within this chapter.

Table 7.1D
Regional Permitting Requirements

Program/Permit	Applicability	Regulatory Authority
Sewer Connection or Extension Permit	Flow > 15,000 gpd or construction of pumping station or sewers of any length.	314 CMR 7.00
Order of Conditions Wetlands Protection Act Rivers Protection Act	Disturbance or alteration of wetlands, waterways, or wildlife habitat.	310 CMR 10.00
Chapter 91 Waterways License Public Waterfront Act	Disturbance or alteration of waterways or flowed or filled tidelands.	310 CMR 9.00
Historic Preservation	Site disturbance, demolition, or alteration of structures or archeological sites listed or eligible for listing on the Massachusetts or National Registers of Historic Places or Archeological Sites.	950 CMR 71.00
Natural Heritage and Endangered Species Program	Work that may affect endangered or threatened species or their habitat.	321 CMR 10.00
U.S. Army Corps Section 404 of the Clean Water Act Section 10 of the Rivers and Harbors Act of 1899	Water diversion; disturbance of > 5,000 s.f. of wetlands; waterways and/or wetlands fill and secondary impacts	33 CFR 1251, et seq.
Water Quality Certification (WQC) Section 401 of the Clean Water Act	Discharge to surface waters involving disturbance of wetlands or land under water. If no WQC thresholds are exceeded but the project requires Category II review by the Army Corps, the Army Corps may allow the Order of Conditions to serve as the WQC. Required if an Individual Section 404 permit is required.	314 CMR 9.00
MEPA ENF/EIR Massachusetts Environmental Policy Act	Sewer construction, disturbance of wetlands above threshold levels.	301 CMR 11.00

The Massachusetts Interbasin Transfer Act (Chapter 658, Acts of 1983 MGL Chapter 21 §§8B-8D) and its regulations (313 CMR 4.00) authorize the Massachusetts Water Resources Commission (WRC) to review any action to increase the transfer of water between river basins. The Act specifically exempts transfers between basins within a single town.

Therefore, any proposed extension of the existing Westminster sewer collection system to areas outside of the Nashua River Basin is subject to review under the Act since the wastewater is treated at the Fitchburg Wastewater Treatment Facility, which discharges to the Nashua River Basin. If a proposed transfer is under 1.0 mgd, the Town may apply to the WRC for a Determination of Insignificance. This is a formal review process under the Act; however, it is more streamlined than a full review.

7.3 Screening of Potential Site Locations for Cluster and Centralized Treatment and Disposal Facilities

In order for the cluster and centralized management approaches to be feasible, a location is necessary to site the treatment and disposal components associated with these approaches. Without an acceptable site, these approaches cannot be considered; therefore, prior to performing the overall screening of the wastewater management approaches described in the previous section, the feasibility of constructing in-town wastewater treatment and disposal facilities must be investigated. The critical element for any facility in Westminster, regardless of its size is a suitable location. The following sections detail the investigations and screening of potential sites for locating cluster and/or centralized treatment and disposal facilities prior to screening the overall approaches to wastewater management.

7.3.1 Preliminary List of Potential Sites

A preliminary list of potential treatment and disposal sites was assembled using the 2005 Westminster assessors database. The development of the list began with a calculation of the minimum land area required for a system. For both cluster and centralized systems, the SAS is the component that requires the largest amount of space. The required land area is a factor of both the quantity of wastewater flow to be discharged and the assumed land application loading rate.

The maximum allowable wastewater flow under the jurisdiction of Title 5 is 10,000 gpd, which is equivalent to thirty three-bedroom homes based on Title 5 flow guidelines. The wastewater effluent loading rate that Title 5 requires for designing a SAS is dependent on soil type and percolation rate. A minimum land area was determined using the range of effluent loading rates and the assumed Title 5 maximum allowable design flow. Because Title 5 also requires construction of a reserve SAS, the minimum land area is quite large and ranges between 30,000 and 60,000 square feet, depending on soil conditions. This calculation includes setback and offset distances required by Title 5 for the SAS, but not additional space for the treatment components and effluent piping. However, the overall size of the SAS can be reduced if an I/A system is utilized. Therefore, the minimum land area estimated for constructing a Title 5 system of this size was assumed to be approximately 40,000 square feet.

Based on the estimated construction, operation, and maintenance costs for a cluster system with a design flow of 10,000 gpd and a maximum of thirty users (discussed subsequently in Section 7.8 of this chapter), the Title 5 cluster approach does not appear to be cost effective on a per user basis. Consequently, it is assumed that a potential cluster system must serve more than thirty homes to warrant consideration in the alternatives analysis. Therefore, the design flow will be greater than 10,000 gpd and a Groundwater Discharge Permit through MA-DEP will be required, as detailed in the previous section of this chapter. A larger cluster system may require more land area than 40,000 square feet to implement; however, this value remained as the assumed minimum land area for selecting potential treatment and disposal sites, based on prior design experience and site conditions in Westminster.

The list of potential sites was initiated by selecting Town-owned parcels that are larger than 40,000 square feet and that are substantially undeveloped. Conservation lands were subsequently removed from the list as those lands are protected. The procedures necessary to convert these lands for construction of in-town treatment and disposal facilities are complex. Article 97, the Constitutional Amendment approved in 1972, was passed to protect open space in the Commonwealth by requiring that a two-thirds vote in both the House and the Senate approve a disposition of land acquired for the purposes of "…the conservation, development and utilization of the agricultural, mineral, forest, water, air, and other natural resources." The Article is administered by the National Park Service (NPS) and according to the Attorney General of the Commonwealth, the following constitute "dispositions" under the Amendment: transfers of legal or physical control between agencies of government, between political subdivisions,

between levels of government, and from public to private ownership. Dispositions include transfers by conveyance, eminent domain, lease, easement, and any other change of legal or physical control, whether the disposition is for the same or different use.

The process necessary for conversion includes obtaining an approving vote of the Conservation Commission and a two-thirds vote of approval from both the Town Meeting and the State Legislature. It would also require initiating the Environmental Notification Form (ENF) process through MEPA. In addition, the process includes seeking comments from the regional planning agency and the Massachusetts Historical Commission regarding the conversion. The conversion request to the NPS may determine replacement lands of equal or greater monetary and recreational value are required, in which a formal conversion request and supporting documentation of the replacement lands are required. Based on these conditions, our preliminary screening has excluded these lands from consideration.

Thirty-four sites (34) were identified in Westminster that meet the treatment and disposal site criteria. There are not many large, undeveloped, Town-owned parcels within reasonable proximity to the needs areas for consideration in siting treatment and disposal systems. Therefore, the preliminary list was supplemented with privately-owned parcels meeting the same criteria (larger than 40,000 square feet and substantially undeveloped). Fifteen (15) privately-owned sites that are located near needs areas were identified. Utilizing privately-owned sites may pose difficulties for the Town. In order to construct a treatment and disposal system, privately-owned sites that contain existing development require subdivision, and the owner must agree to sell the site to the Town at fair market value. All preliminary sites are summarized in Table 7.2 and displayed on Figure 7-3, which is attached at the end of this report (prior to appendices). The table lists the Town-owned sites at the top and privately-owned sites at the bottom and assessors data is also provided. Town-owned sites are color coded in orange on the figure and privately-owned sites are color coded in green.

An initial screening was performed for the preliminary sites using available data. Sites for cluster or centralized treatment facilities must include some basic physical characteristics that make the treatment and disposal of wastewater possible. As discussed, potential sites must have adequate acreage to support necessary treatment equipment and to accept large quantities of treated effluent with an adequate buffer from public areas. Disposal locations must consist of soil types that can rapidly process system effluent, and also must have adequate groundwater depths that allow ample contact time between effluent and the soil. Many other characteristics contribute to an advantageous site, but the few criteria mentioned above are essential to the successful development of potential sites. Soil type and depth to groundwater characteristics of the Town of Westminster were inventoried in previous chapters of the CWMP. These characteristics were used in conjunction with Town GIS mapping and aerial photography to pre-screen all preliminary sites and locate parcels for subsequent site visits.

A total of twenty (20) parcels were selected for site visits and are represented in bold in Table 7.2. All privately-owned parcels appeared suitable for conducting site visits; however, most of the Town-owned parcels did not for several reasons as follows: Sites A-1 through A-13 are located in the northern extent of Town and are not close enough to needs areas to warrant consideration. Based on estimated sewer collection system costs, it was assumed that potential sites located greater than 1-mile from needs areas would not be cost effective to warrant consideration. The cost to connect a needs area with a treatment and disposal site that is located 1-mile away can range from $550,000 to $1.1 million dollars, depending on the type of collection system. This cost does not include the cost of the collection system within the needs area. Also, several of these sites in the northern extent of Town do not have access to public ways. Many of the sites in the central and southern portions of Town (A-14 to A-34) consist of substantial wetlands and do not have adequate upland for construction, based on GIS mapping. Sites A-17 and A-19 have adequate size for implementation of potential cluster systems, and are located within 1-mile of Needs Area 7. However, the roadways between Needs Area 7 and Sites A-17 and A-19 are currently

served by municipal sewers. Therefore, this option for Needs Area 7 would require installing approximately 3,700 linear feet of sewer collection system adjacent to existing municipal sewers, which is not an effective approach. Sites A-17 and A-19 are located greater than 1-mile from the next closest needs area. Site A-18 is designated for future development of affordable housing by Westminster. Site A-21 is located on Meetinghouse Pond and provides resource protection to this surface water reservoir. Sites A-33 and A-34 were not selected for site visits since they have already been extensively researched as part of the Town's groundwater well exploration program. Based on this initial screening, five Town-owned parcels warranted site visits.

Table 7.2
Potential Site Locations
for Treatment and Disposal Systems

Site No.	Parcel No.	Owner	Address	Address No.	Status	Use	Bedrooms	Area (sq. ft.)
A-1	4-19	TOWN OF WESTMINSTER	LAWS RD	4	Vacant	MUNICIPAL	0	87,936
A-2	7-2	TOWN OF WESTMINSTER	ASHBURNHAM STATE RD	0	Vacant	MUNICIPAL	0	280,057
A-3	14-3	TOWN OF WESTMINSTER	FRED SMITH RD	49	Vacant	MUNICIPAL	0	55,063
A-4	20-15	TOWN OF WESTMINSTER	NEEDHAM RD	0	Vacant	MUNICIPAL	0	44,598
A-5	20-14	TOWN OF WESTMINSTER	NEEDHAM RD	0	Vacant	MUNICIPAL	0	62,588
A-6	20-13	TOWN OF WESTMINSTER	NEEDHAM RD	0	Vacant	MUNICIPAL	0	63,741
A-7	20-12	TOWN OF WESTMINSTER	NEEDHAM RD	0	Vacant	MUNICIPAL	0	53,046
A-8	20-11	TOWN OF WESTMINSTER	NEEDHAM RD	0	Vacant	MUNICIPAL	0	115,958
A-9	21-1	TOWN OF WESTMINSTER	OAKMONT DR-OFF SO ASHB	0	Vacant	MUNICIPAL	0	1,028,696
A-10	24-7.3	TOWN OF WESTMINSTER	KIRALI CT-REAR	0	Vacant	MUNICIPAL	0	528,702
A-11	27-1	TOWN OF WESTMINSTER	BEAN PORRIDGE HILL RD-REAR	0	Vacant	MUNICIPAL	0	1,630,114
A-12	53-63	TOWN OF WESTMINSTER	OAKMONT AVE	0	Vacant	MUNICIPAL	0	47,173
A-13	58-2	TOWN OF WESTMINSTER	OLD ASHBURNHAM	0	Vacant	MUNICIPAL	0	2,015,180
A-14	82-19	TOWN OF WESTMINSTER	WEST MAIN ST	0	Vacant	MUNICIPAL	0	164,342
A-15	98-41	TOWN OF WESTMINSTER	STATE RD EAST	0	Vacant	MUNICIPAL	0	103,693
A-16	**115-2**	**TOWN OF WESTMINSTER**	**FITCHBURG RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**596,338**
A-17	110-86	TOWN OF WESTMINSTER	ACADEMY HILL RD	28	Vacant	MUNICIPAL	0	81,720
A-18	109-10	TOWN OF WESTMINSTER	MAIN ST-REAR	0	Vacant	MUNICIPAL	0	734,894
A-19	110-91	TOWN OF WESTMINSTER	ACADEMY HILL RD	0	Vacant	MUNICIPAL	0	88,211
A-20	124-34	TOWN OF WESTMINSTER	KNOWER RD-REAR	0	Vacant	MUNICIPAL	0	128,325
A-21	124-8	TOWN OF WESTMINSTER	SOUTH ST	0	Vacant	MUNICIPAL	0	999,940
A-22	**122-8**	**TOWN OF WESTMINSTER**	**HAGER PARK RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**288,907**
A-23	128-14	TOWN OF WESTMINSTER	MINOTT RD	0	Vacant	MUNICIPAL	0	1,872,247
A-24	**132-3**	**TOWN OF WESTMINSTER**	**ELLIS RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**816,709**
A-25	128-14	TOWN OF WESTMINSTER	MINOTT RD	0	Vacant	MUNICIPAL	0	465,445
A-26	128-14	TOWN OF WESTMINSTER	MINOTT RD	0	Vacant	MUNICIPAL	0	138,594
A-27	131-11	TOWN OF WESTMINSTER	MINOTT RD	0	Vacant	MUNICIPAL	0	1,159,125

Table 7.2
Potential Site Locations
for Treatment and Disposal Systems

Site No.	Parcel No.	Owner	Address	Address No.	Status	Use	Bedrooms	Area (sq. ft.)
A-28	135-8	TOWN OF WESTMINSTER	FROG HOLLOW RD	0	Vacant	MUNICIPAL	0	86,525
A-29	135-2	TOWN OF WESTMINSTER	FROG HOLLOW RD	35	Vacant	MUNICIPAL	0	374,725
A-30	**148-18**	**TOWN OF WESTMINSTER**	**WORCESTER RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**2,783,790**
A-31	131-11	TOWN OF WESTMINSTER	MINOTT RD	0	Vacant	MUNICIPAL	0	206,617
A-32	**147-81**	**TOWN OF WESTMINSTER**	**EDRO ISLE RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**50,236**
A-33	163-15.1	TOWN OF WESTMINSTER	HONEYBEE LN-REAR	0	Vacant	MUNICIPAL	0	611,285
A-34	163-14	TOWN OF WESTMINSTER	CHESTNUT ST-LEINO PK	0	Vacant	MUNICIPAL	0	600,536
Privately-Owned Sites								
A-35	**89-23**	**RANA ALDO & RONALD S & MATILDA IANDOLI**	**NORTH COMMON RD-REAR**	**0**	**Vacant**	**RES**	**0**	**211,813**
A-36	**102-1.2**	**Information Not Available**						**50,445**
A-37	**102-1.63**	**Information Not Available**						**70,530**
A-38	**103-6**	**Information Not Available**						**293,869**
A-39	**108-16**	**WESTMINSTER GOLF CRSE**	**ELLIS RD**	**51**	**Commercial**	**GOLF CRSE**	**0**	**4,387,233**
A-40	**103-4**	**LATORRE DENNIS & PLASZEWSKI DEBORAH A**	**PARK ST**	**12**	**Residential**	**Single Fam**	**2**	**936,318**
A-41	**107-25**	**WESTMINSTER SPORTSMAN CLUB INC**	**ELLIS RD**	**0**	**Vacant**	**FISH&GAME**	**0**	**722,861**
A-42	**108-5**	**LEBLANC ALBERT J**	**ELLIS RD**	**0**	**Vacant**	**RES**	**0**	**83,972**
A-43	**121-23**	**ARCANGELI VICTOR EST**	**NARROWS RD-REAR**	**0**	**Residential**	**Single Fam**	**2**	**1,881,630**
A-44	**127-1**	**DERZIUS DAVID R & DERZIUS MARY ANN**	**ELLIS RD**	**144**	**Vacant**	**RES**	**0**	**149,511**
A-45	**139-36**	**GIROUARD OSCAR J**	**LAKEWOOD PARK RD**	**20**	**Vacant**	**RES**	**0**	**69,831**
A-46	**138-34**	**MCFARLAND COLLEEN**	**LAURIE LN-REAR**	**0**	**Vacant**	**RES**	**0**	**216,730**
A-47	**148-3.1**	**Information Not Available**						**929,553**
A-48	**148-5**	**CITY OF FITCHBURG WATER DEPT**	**WORCESTER RD**	**0**	**Vacant**	**MUNICIPAL**	**0**	**189,565**
A-49	**162-2**	**WINTTURI ELLEN (LE)**	**WORCESTER RD**	**0**	**Vacant**	**AC LND IMP**	**0**	**3,554,950**

7.3.2 Treatment and Disposal Site Visits

Site visits were conducted at candidate sites and the results are summarized below. The results of previous investigations at the Town's potential groundwater well sites (A-33 and A-34) as they relate to wastewater treatment and disposal are also summarized below. Town-owned parcels were visually surveyed to assess their potential for supporting wastewater treatment and disposal facilities. Site characteristics were noted such as ledge outcrops, wetlands, surface water, steep slopes, zoning, and existing development. Town-owned sites that could not be readily accessed from public ways were not surveyed. In addition, privately-owned sites were only surveyed from the property edges that abut public ways. Sites that show potential for wastewater treatment and disposal based on the site visits warrant subsurface investigation.

7.3.2.1 A-16 – Fitchburg Road Site (Town)

The site was accessed from Fitchburg Road (Route 31). It consists of 13.7 acres of undeveloped Town land and is located across the street from the Pinetree Power plant. The site topography slopes downward moderately from Fitchburg Road to the east. The site is situated between Fitchburg Road and Sawmill Pond. No wetlands were visible on the site; however there appears to be wetlands located between the site and the pond. There are many visible boulders and rock outcrops on the site and there is moderate to dense tree cover. An existing municipal sewer is located adjacent to the site, on Route 31.

The site is large and has adequate land area for a centralized facility or a cluster system near Fitchburg Road. However, the subsurface conditions are most likely unfavorable based on the numerous boulders and rock outcrops. The site is adjacent to Needs Area 17. Most of Needs Area 17 is zoned for future industrial development. Future industrial development may produce wastewater of a character and volume that is not suitable for treatment and disposal at a cluster system. A centralized facility may have negative water quality impacts to Sawmill Pond. **Consequently, the Fitchburg Road Site is not recommended for further investigation as a potential cluster system or centralized facility site.**

7.3.2.2 A-22 – Hager Park Site (Town)

The 6.6 acre site was accessed from Hager Park Road. It consists of recreational area under the jurisdiction of the Hager Park Commission with a parking lot and walking trails. There is no existing development on the site; however, it abuts the Fitchburg Water Treatment Facility. The site has gradual slope at the north end and is generally flat at the south end. There are many surface stones and boulders on the site, but there were no visible rock outcrops. The site has moderate tree cover.

The site is likely too small for consideration of a centralized facility, but has adequate land area for a cluster system. Utilizing the site for a cluster system would prevent the use of the site for recreational purposes for the duration of construction. It may also reduce the land area available for recreational use once construction is complete. The site is located just under 1-mile from both Needs Area 14 and Needs Area 21. This would require collection systems of significant length to convey wastewater from the needs area(s) to the site. It is not anticipated that a wastewater discharge from a cluster system at this site would have negative impacts to water quality at the adjacent water treatment facility. **The site has some limitations; however, there are few Town-owned sites with potential for use as wastewater treatment and disposal sites. Consequently, the Hager Park Site is recommended for further investigation as a potential cluster system site.**

7.3.2.3 A-24 – Partridge Hill Road Site (Town)

The site is not accessible from local roads. It requires access through private property at 11 or 12 Partridge Hill Road. It consists of 18.7 acres of undeveloped Town land. The site gradually slopes downward from Partridge Hill Road to the southwest, and is at a significantly lower elevation than the

surrounding neighborhood. GIS mapping indicates that southwestern portions of the site with lower elevations consist of wetlands and flood plain. The site has dense tree cover.

The site appears to have adequate land area within the northern portion for a cluster system, based on mapping. It is located approximately ¾-mile from Needs Area 19 and just over 1-mile from Needs Area 20. This would require collection systems of significant length to convey wastewater from the needs area(s) to the site. An easement would be necessary through 11 or 12 Partridge Hill Road to install sewers and for access to the treatment and disposal facility. A potential cluster system would most likely be located within close proximity to the residence at 12 Partridge Hill Road. **The Partridge Hill Road Site is not recommended for further investigation due to limited access and easement requirements and potential impacts to neighboring residences.**

7.3.2.4 A-30 – Worcester Road Site (Town)

The site was accessed from Worcester Road at the north end and from Andrea Lane at the south end. It consists of 63.9 acres of undeveloped Town land. The site slopes downward from Worcester Road and then it gradually ascends heading west. There are many surface stones and boulders on the site, but there were no visible rock outcrops. The site has moderate to dense tree cover. The southern portion of the site is at a lower elevation and consists of vast wetlands and Smith Brook. The brook is a perennial stream that runs from north to south along the eastern side of the site. The site is under the jurisdiction of the Hager Park Commission.

The site has significant land area within the central and western portions that is suitable for a potential treatment and disposal facility. The southern portion of the site that abuts Worcester Road is within close proximity to Needs Area 21; however, access at the southern end of the site requires crossing the brook and wetlands. The northern access location along Worcester Road is located approximately ¾-mile from Needs Area 21; therefore, a collection system of moderate length would be needed to convey wastewater from the needs area into the site at this location. This access point has steep slopes and also requires crossing the brook. Significant grading would be necessary to install an access road into the site at this location. There is no other access to the site. Accessing the property was discussed with the Conservation Commission and the Hager Park Commission. It was determined that access from the east side would be challenging and potentially require extensive permitting. Access from West Princeton Road on the west side would require crossing private property. The Hager Park Commission is planning to conduct tree clearing activities on the site and may also plan recreational trails for the site in the near future. **The Worcester Road Site is recommended for further investigation as a potential cluster or centralized facility site; however, at this time, it appears that access to the site for subsurface investigation will require extensive permitting and access road construction.**

7.3.2.5 A-32 – Edro Isle Road Site (Town)

The Edro Isle Road Site was previously investigated during the Wastewater Needs Analysis phase of this report. The site was accessed from the end of Edro Isle Road. It consists of a beach on Wyman Pond for recreational use by the neighboring residents. The 1.15 acre site is flat with bordering trees, brush, and wetlands.

The subsurface investigation conducted on the site indicates that the soils consist of sand and gravel and the groundwater depth is less than 3-feet from ground surface. Although the site is located within the portion of Needs Area 21 that exhibits the greatest wastewater need, the groundwater depth makes it extremely difficult to use the site for wastewater disposal. The area of the site is approximately 50,000 square feet, but a significant portion of that area would be required to maintain wetland setbacks, based on the site geometry. **Consequently, the site is not adequate for a potential cluster facility and is not recommended for further investigation.**

7.3.2.6 A-33 and A-34 – Leino Park Sites (Town)

The Leino Park Sites are located immediately west of the Leino Park neighborhood on Wyman Pond. The sites are also located off of Honeybee Lane, approximately 2,300-feet east of Worcester Road. GIS mapping indicates that the sites contain some small wetland areas and have moderate to steep slopes. Most of the land area on the western side of Site A-34 (13.8 acres) does not consist of wetlands and was cleared for use as a gravel pit. Site A-33 consists of 14 acres of undisturbed land with varying topography.

Test wells were drilled in 1993 at six locations throughout the sites. The soils generally consist of sand and gravel. Refusal was encountered at shallower depths on Site A-34, while the wells on Site A-33 were advanced to much greater depths. This may be due to past gravel pit operations on Site A-34. Groundwater was measured at shallow depths in the wells on Site A-33. It appears that the wells on Site A-33 were drilled in areas with lower elevations near wetlands, which may account for the shallow groundwater. The test wells indicate that soil conditions on the sites are generally suitable for wastewater disposal. However, soil conditions appear less permeable proceeding to the northwest, as there appears to be glacial till west of the sites. Bedrock appears to be limiting on Site A-34, while areas of lower elevation on Site A-33 appear to have groundwater limitations. Site A-33 is a potential location for a cluster system to serve Needs Area 23, which is an inaccessible needs area that poses challenges to improved wastewater management. Site A-34 appears to have shallow bedrock, which could cause excessive groundwater mounding resulting from the operation of a cluster system. The Town identified the sites for a potential future municipal groundwater well in 1971 and has conducted several studies of the sites since that time. Constructing a cluster system on Site A-33 would limit the installation of a municipal drinking water well also. Municipal groundwater wells would require wellhead protection areas that limit uses on the land surrounding them. Water quality impacts to a potential municipal well from a wastewater disposal system would also be a concern. **The site is suitable for both water supply and wastewater management; however, the Town must decide on the optimal use of these sites and proceed on that basis.**

7.3.2.7 A-35 – North Common Road Site (Private)

The site was accessed from North Common Road. It consists of 4.9 acres of undeveloped land. There is a narrow strip of land on this parcel extending east from North Common Road. The majority of the land on the parcel is located behind the homes at 3-13 North Common Road. The site gradually slopes downward from North Common Road to the east. GIS mapping indicates that the eastern portion of the site with lower elevation abuts wetlands. No evidence of rock outcrops was noted. The site has dense tree and brush cover near North Common Road.

The site appears to have adequate land area for a cluster system within the northern portion behind the residences, based on mapping. It is located centrally within Needs Area 7. It appears that wastewater from approximately half of the needs area could flow by gravity to the site. A potential cluster system on the site would be located near the residences at 3-13 North Common Road. **Overall, the site has potential for installing a cluster system to serve users in Needs Area 7. Site A-35 is privately-owned and further investigation would require permission from the owner and significant land clearing to allow access for testing equipment.**

7.3.2.8 A-36 – State Road West Site A (Private)

The site was investigated from State Road West, which it abuts. It consists of 1.16 acres of undeveloped land. The site slopes upward from State Road West towards the south. The topography consists of moderate to steep slopes. A portion of the site was visible from State Road West through a roughly graded access road. Many surface stones and boulders were visible, but no rock outcrops were noted. The site has moderate to dense tree cover. There is a narrow strip of property located between this site

and Site A-37 that is owned by the Westminster Country Club. This golf course property continues between the sites to a larger lot south of Site A-36, which abuts the main golf course parcel.

The site has adequate land area for a cluster system; however, the site topography and potential subsurface boulders would make siting a system of significant size challenging. It is located centrally within Needs Area 11. Based on available mapping, wastewater from homes within the area may be able to flow by gravity to the site. A potential cluster system on the site would be located near the residence at 72 State Road West. The municipal assessors data does not have information for this lot; therefore, the owner is uncertain. **Overall, the site has potential for installing a cluster system to serve users in Needs Area 11. The owner of the site should be determined to assess the potential for conducting further investigation.**

7.3.2.9 A-37 – State Road West Site B (Private)

Site A-37 was investigated from State Road West. It consists of 1.62 acres of undeveloped land. This site was not visible from State Road West; however, it is assumed that its characteristics closely follow those of Site A-36 since it is less than 100-feet away.

The site has more overall land area for a cluster system than Site A-36; however, the site is narrower. Much of the site extends uphill from the roadway. The site geometry and topography would make construction of a cluster system more difficult than on Site A-36. A potential cluster system on the site would be located near the residence at 58 State Road West. The municipal assessors data does not have information for this lot; therefore, the owner is uncertain. **Overall, the site has little potential for installing a cluster system than Site A-36; therefore, additional investigation is not recommended.**

7.3.2.10 A-38 – Spring Street Site (Private)

The site was investigated from Spring Street. It consists of 6.75 acres of undeveloped land. The site slopes upward from Spring Street to the southeast. The topography consists of minor slopes. A portion of the site was visible from the street through the tree cover. Many boulders and rock outcrops were visible. The site has moderate tree cover.

The site has adequate land area for a cluster system; however, it is expected that the subsurface conditions are not suitable based on the size of visible boulders and the extent of rock outcrops. The extent of the site that was not visible from the street is not readily accessible from Needs Area 10. Assessors data is not available for this lot; therefore, the owner is uncertain. **The site is not suitable for a potential cluster facility and is not recommended for further investigation.**

7.3.2.11 A-39 – Westminster Country Club Site A (Private)

The 100 acre site was investigated from Ellis Road. It consists of a privately-owned golf course. There did not appear to be any large undeveloped areas on the parcel. The site is not suitable for a potential cluster facility and is not recommended for further investigation. Although the golf course is not municipally owned, there still is potential for a water reuse application. There is an existing municipal wastewater pump station located at the golf course which could provide wastewater for treatment and use for spray irrigation at the golf course. The wastewater treatment and non-potable distribution system would be an expense to the golf course, but could potentially save the course money over the long term through reduced water and wastewater usage charges. **It is recommended that the golf course be consulted by the Town to evaluate its interest in water reuse opportunities.**

7.3.2.12 A-40 – Park Street Site (Private)

The site was investigated from Park Street. It consists of a residence and a storage building on 21.5 acres. The site slopes upward from Park Street to the southeast. The topography consists of minor to moderate

slopes. The site was further accessed from the driveway of the residence. Much of the site that was visible is currently used as a construction yard and for storage.

There is a significant portion of the site to the south of the existing residence that is currently not used, based on aerial photography. GIS mapping does not show any problematic features within that portion of the site. There appears to be adequate land area for a potential cluster system in the southern portion of the site; however, it is not easily accessible from Park Street. An easement or a subdivided piece of property along the western property line would be needed to install sewers and for access to a treatment and disposal facility. Gaining permission to subdivide and utilize this land for this purpose may be a lengthy and costly process. T**he site has potential for installing a cluster system to serve users in Needs Area 10. Site A-40 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.2.13 A-41 – Partridge Pond Site (Private)

The 16.6 acre site was investigated from Ellis Road. The portion of the site near the road consists of undeveloped land containing a stream fed by Partridge Pond. The site slopes from the east and west sides to the stream in the center of the site. GIS mapping indicates that the northern portion of the site consists of mainly wetlands.

The existing topography, wetlands, and stream make this site unsuitable for use in siting a potential cluster system. No further investigation is recommended.

7.3.2.14 A-42 – Westminster Country Club Site B (Private)

The 1.9 acre site was investigated from Ellis Road. Although the Town assessors records identify the site as vacant residential land, it consists of a portion of the Westminster Country Club. **There is not adequate unused land on the parcel for locating a potential cluster system; consequently, no further investigation is recommended.**

7.3.2.15 A-43 – Laurelwood Drive Site (Private)

The 43 acre site was investigated from Linda Drive and Laurelwood Drive. It consists of a single residence with large amounts of undeveloped land. A gravel access road passes through the eastern portion of the site to provide access to several homes on Wyman Pond. The topography along the access road consists of minor to moderate slopes. No rock outcrops or surface boulders were visible. GIS mapping does not show any problematic features within other areas of the site. The site has moderate to dense tree cover.

The site has adequate land area for a potential cluster system to serve Needs Area 14 or for a potential centralized facility to serve several areas. The site is adjacent to Needs Area 14 and under ½-mile from Needs Area 15. T**he site has potential for installing a cluster or centralized facility. Site A-43 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.2.16 A-44 – Ellis Road Site (Private)

The site was investigated from Ellis Road, which it abuts. It consists of 3.43 acres of undeveloped land between two developed residential parcels. The site topography is generally flat. A small portion of the site was visible from Ellis Road through the tree cover. There were some visible surface rocks and boulders. The site has dense tree cover. GIS mapping indicates there are wetlands along the western side of the site.

Despite the wetlands, the site has adequate land area for a potential cluster system. The geometry of the site and the wetlands may pose some challenges in siting a system of significant size. The site is located about 1/3-mile from Needs Area 19 and just over 2/3-mile from Needs Area 20; therefore, a collection system of moderate length would be necessary to convey wastewater to the site. A potential cluster system on the site would be located near the residences at 142 and 152 Ellis Road. T**he site has potential for installing a cluster system to serve users in Needs Areas 19 and 20. Site A-44 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.2.17 A-45 – Lakewood Park Road Site (Private)

The site was investigated from Lakewood Park Road, which it abuts. It consists of 1.6 acres of undeveloped land between two developed residential parcels. The site slopes upward to the southeast from the road. The topography is moderate to steep. The site was accessible through a well-worn gravel access road. There were not any visible surface rocks and boulders. The site is partially cleared with moderate tree cover.

The site has adequate land area for a potential cluster system. The existing residences at 16 and 24 Lakewood Park Road are located within close proximity to Site A-45 and there is not a significant natural buffer between the residential parcels and the site. In particular, the residence at 16 Lakewood Park Road is approximately 30-feet from the site property line. Obtaining support from local residents would be difficult. The topography and setbacks from Wyman Pond may limit the size of a cluster system. The site is located in Needs Area 15 and adjacent to Needs Area 22, an inaccessible needs area that poses challenges to improved wastewater management. T**he site has limited potential for installing a cluster system, but could provide service to Needs Area 22. Site A-45 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.2.18 A-46 – Laurie Lane Site (Private)

The site was investigated from Laurie Lane. It consists of 4.98 acres of undeveloped land. There is a narrow strip of land on this parcel extending west from Laurie Lane. The majority of the land on the parcel is located behind the homes at 12-24 Laurie Lane. The site is accessible through a gravel access road that extends into the site from Laurie Lane along the narrow strip of land. The site gradually slopes upward from Laurie Lane to the west. No evidence of rock outcrops was noted. The site has dense tree and brush cover. Cleared portions of the site are used for materials stockpiling and storage.

The site has adequate land area for a potential cluster system and is located in Needs Area 21. **The site has potential for installing a cluster system to serve users in Needs Area 21. Site A-46 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.2.19 A-47 – Patricia Road Site (Private)

The site is not accessible or visible from Patricia Road. It requires access from Worcester Road through a long, narrow strip of land that is part of the property. The site is a 21 acre undeveloped parcel. The site also abuts Site A-46. GIS mapping does not show any problematic features within the site. Assessors data is not available for this lot; therefore, the owner is uncertain.

The site consists of a vast area that may be suitable for constructing a cluster or centralized facility. It is located adjacent to Needs Area 21. T**he site has potential for installing a cluster or centralized facility. The owner of the site should be determined to assess the potential for conducting further investigation.**

7.3.2.20 A-48 – Fitchburg Water Department Site (Private)

The site is accessible from Worcester Road. It is a 4.35 acre undeveloped parcel. The site surrounds a small surface water body adjacent to Worcester Road. A visual assessment was not obtained due to limitations from dense tree and brush cover. GIS mapping indicates that the southern half of the site consists of FEMA 100-year flood plain. The northern portion of the site consists of moderate to steep slopes, based on the mapping.

Assessors data indicates that the City of Fitchburg Water Department is the owner of the parcel. The Water Department also owns the parcel on the opposite side of Worcester Road. **The site conditions are not favorable to warrant consideration of Site A-48 for siting a cluster system; therefore, additional investigation is not recommended.**

7.3.2.21 A-49 – Honeybee Lane Site (Private)

The 81 acre site was investigated from Honeybee Lane. It consists of large areas of undeveloped land in the western portion of the site with active gravel excavation operations located in the eastern portion. Honeybee Lane is a gravel road that passes through the site from Worcester Road on the western side to Old Oak Avenue in Leino Park on the eastern side. The topography along the road consists of minor to moderate slopes. GIS mapping indicates that there are steep slopes in the southeastern portion of the site. No rock outcrops or surface boulders were visible, as the land consists of mainly sand and gravel. GIS mapping does not show any concerning features within other areas of the site. The site has moderate to dense tree cover.

The site has adequate unused land area for a potential cluster system to serve Needs Area 23 or for a potential centralized facility to serve several areas. Site A-49 is also adjacent to Needs Area 21. Previous subsurface investigations conducted by the Town at the Leino Park Sites (A-33 and A-34) identified favorable conditions for wastewater disposal. This site is adjacent to the Leino Park Sites; therefore, similar conditions are anticipated. **The site has potential for installing a cluster or centralized facility. Site A-49 is privately-owned and further investigation would require permission from the owner to allow access for testing.**

7.3.3 Treatment and Disposal Site Visit Conclusions

The potential treatment and disposal site visits determined that two Town-owned parcels have potential for large-scale wastewater treatment and disposal. The parcels are Site A-22 and Site A-30, as detailed in the previous section. In addition, previous subsurface investigations at Site A-33 indicate favorable conditions.

- Site A-22 consists of the portion of Hager Park located on the east side of Worcester Road. Although the site appears to be suitable for a potential cluster system to serve Needs Area 14 and/or Needs Area 21, a system would impact recreational use of the site.
- Site A-30 consists of a large Hager Park Commission parcel located on the west side of Worcester Road at Hager Park Road. The site appears to be suitable for a potential centralized facility to serve several needs areas or a cluster system to serve Needs Area 21; however, it does not appear to be accessible for conducting subsurface investigations.
- Sites A-33 consists of one of two municipal groundwater well exploration sites west of Leino Park. Site A-33 appears to be suitable for a potential cluster system to serve Needs Area 23; however, a future Town drinking water well is planned for the sites. If the Town well is still a planned priority, then a cluster system should not be considered for the sites.

Site visits determined that nine privately-owned parcels have potential for large-scale wastewater treatment and disposal. In order to conduct subsurface investigations, the Town would need to gain

permission from the owners of these sites to allow access for testing. The parcels are Site A-35, Site A-36, Site A-40, Site A-43, Site A-44, Site A-45, Site A-46, Site A-47, and Site A-49, as detailed in the previous section. Some privately-owned sites received more extensive field surveys based on accessibility and extent of tree/brush growth. Other sites were assessed more through the use of GIS mapping.

In general, privately-owned parcels have less potential for siting a centralized facility or a cluster system because they must first be acquired by the Town for a reasonable price. Many of the privately-owned parcels are also located within close proximity to residences. Several privately-owned parcels appear more favorable than others, based on the site visit summaries in the previous section. These parcels are Site A-40, Site A-43, Site A-46, and Site A-49. These sites contain a substantial amount of land in which a smaller portion could be subdivided and purchased by the Town, while still providing adequate setbacks between a treatment and disposal facility and neighboring homes. In some cases, the land would otherwise be unusable to the owner based on current zoning in Town.

- Site A-40 consists of a large parcel off of Park Street that currently has one residence on it. There is significant land in the southern portion of the site that appears suitable for a potential cluster system to serve Needs Area 10. Gaining access to this portion of the site may be an issue.
- Site A-43 consists of a large parcel along Linda Drive and Laurelwood Drive that currently has one residence on it. There is significant land on the site that appears suitable for a potential cluster system to serve Needs Area 14, 15, or 21 or a centralized facility to serve several areas.
- Site A-46 consists of a medium-sized parcel off Laurie Lane that is currently undeveloped. The site appears suitable for a potential cluster system to serve Needs Area 21 with enough area to maintain adequate setbacks from existing homes in the area.
- Site A-49 consists of a large parcel along Honeybee Lane that is currently undeveloped. There is significant land on the site that appears suitable for a potential cluster system to serve Needs Area 21 and/or Needs Area 23 or a centralized facility to serve several areas.

These Town-owned and privately-owned sites have favorable conditions that warrant subsurface investigation to determine their potential wastewater disposal capacity. For each of these candidate sites, cluster and/or centralized wastewater management systems for Westminster's needs areas are analyzed in further sections. The remaining sites contain numerous features or limitations that are not suitable for a treatment and disposal facility.

7.4 Alternatives Screening Methodology

The goal of the Wastewater Management Alternatives Analysis is to screen the approaches to wastewater management to determine the best method for treating and disposing Westminster's wastewater. The screening methodology carries this out by examining each wastewater needs area in Town to match it with the most favorable wastewater management approach.

Wastewater management approaches were evaluated using wastewater management screening criteria developed for this task. There are four categories of screening criteria, which are engineering, environmental, municipal, and population. This is explained further in Table 7.3, which summarizes the wastewater management screening criteria that were utilized.

Scores were assigned for each criterion for each management approach explored. Scores ranged from negative values for unfavorable assessments to positive values for favorable assessments. Overall scores were compiled to assist in determining suitable approaches for each needs area. An alternatives analysis worksheet containing the scoring table is attached to this report as Appendix D. The overall scores were used to guide the ratings; however, despite favorable scoring, certain practical considerations could

potentially override the assessment. For example, should acquiring a site for implementation of a cluster system be deemed highly unlikely, that solution would be screened out of consideration. The screening criteria were applied to each management approach in each needs area to arrive at wastewater management assessments as described in the following section.

Once numeric scores were compiled for all management approaches, they were translated to word scores for each needs area, which simply describe the suitability of the approach based on impacts it generates. The word scores consist of favorable, neutral, and unfavorable. The overall word scores were compared for each approach within each needs area to reveal the best management solution. The results were then reviewed for suitability to ensure they reflected the overall conditions prior to arriving at wastewater management determinations.

Table 7.3
Wastewater Management Screening Criteria

Criteria		Description
Engineering	Technical Feasibility	Assesses the technical feasibility.
	Operational Constraints	Assesses the ease or difficulty associated with operational requirements.
	Reliability & Performance	Assesses the reliability and performance of typical technologies.
	Cost	Primarily assesses the construction costs but also includes long-term operation and management costs.
Environmental	Groundwater Recharge	Assesses the impacts to groundwater resources.
	Environmental Impact/Benefits	Assesses the impacts to the environment such as critical resources and public health under normal operations.
	Contamination Risk	Assesses the risk of contaminating surface- or ground-waters under failure or other non-fully operational conditions.
Municipal	Ownership & Control	Assesses the extent of Town's ownership and control.
	Legal Liability	Assesses potential legal responsibilities.
	Permit Requirements	Assesses the relative ease or difficulty of obtaining the necessary permits.
	Political Reality	Assesses political viability, particularly as it relates to agreements with other municipalities, companies, or state agencies.
Population	Odor Impacts	Assesses possible odor impacts to local receptors.
	Visual Aesthetics	Assesses possible visual impacts to local receptors.

The screening process seeks to sort each needs area into one of three categories:

On-Site Wastewater Management – The on-site assessment category denotes needs areas where on-site wastewater management is sufficient through the twenty-year planning period of the report and significant negative impacts are not expected within that time frame.

Centralized/Regional Wastewater Management – The centralized/regional assessment category refers to either the centralized or regional management approach. A few sites were identified with potential to support a centralized treatment and disposal facility and require additional investigations to assess their feasibility. Therefore, the final determination will be made in a later phase of the alternatives analysis.

This determination was divided into high priority and low priority classifications based on the relative need of each needs area receiving a centralized/regional assessment. High priority determinations describe needs areas where on-site wastewater management is a burden to owners, or resource contamination and health risks are likely. These areas should receive immediate attention to alleviate the current conditions. The low priority centralized/regional determination describes needs areas where on-site wastewater management is sufficient for the short term, and is not an immediate threat to resources. However, long-term conditions are expected to degrade and the areas will require attention.

Possible Cluster Wastewater Management – As discussed in the previous section, several sites were identified with potential to support a cluster treatment and disposal facility; however, additional field investigations are required to determine the actual technical feasibility of these sites. In addition, privately-owned sites require research to determine if the entire site, or a portion thereof, can be obtained for use in this application. Therefore, this determination is provisional pending the results of additional investigations.

The overall alternatives determinations are summarized in Table 7.10 of the Wastewater Alternatives Analysis located in Section 7.10.

7.5 On-Site Approach Screening

The on-site wastewater management approach can provide an effective solution to some of the Town's wastewater needs. This approach benefits local river basins through continued groundwater recharge and can be cost-effective when compared with other approaches, depending on site conditions. However, the on-site approach has a higher risk of causing groundwater and surface water contamination under certain unfavorable conditions, and can cost considerably more on a per user basis than centralized or regional approaches. The suitability of the on-site approach depends largely on local conditions and nearby resources.

The application of this approach can also vary according to the management method used by the Town. In the Town of Westminster, the Board of Health governs the installation and use of on-site systems under the Title 5 regulations, with superseding additions as described in Chapter 2 of this report. The Town could enhance their approach by adopting additional regulations.

This section of the chapter assesses the adequacy of utilizing on-site solutions for the needs areas in Town. The section provides an overview of the on-site approach, followed by ratings for both continued use of the current on-site management structure and a more aggressive on-site wastewater management structure using the screening criteria previously developed.

7.5.1 On-Site Treatment and Disposal Approaches

Conventional Title 5 subsurface disposal systems, referred to as septic systems, function as small, on-site treatment and disposal facilities. As described in Chapter 2, septic tanks provide primary wastewater settling, and Soil Absorption Systems (SAS) provide effluent polishing and disposal. Supplementary wastewater treatment can be achieved by the addition of I/A technologies that can overcome site limitations and provide further resource protection. An on-site approach to wastewater management can limit growth and development because site limitations (poor soils and high groundwater) and siting restrictions (e.g. setbacks from lot lines, structures, and wells) can effectively reduce the area available for proposed developments. The on-site approach also promotes groundwater recharge thereby reducing the impact to the natural water cycle, and providing baseflow to streams during dry periods. However, on-site systems lack the close monitoring and control associated with centralized and regional approaches, and thereby pose a potential threat to water quality and public health. Moreover, many older systems in Westminster, particularly cesspools, do not comply with Title 5 and do not meet current on-site disposal standards. Therefore, many on-site systems currently in use pose a threat to water quality and public health.

7.5.1.1 Conventional Title 5 Systems

In a properly functioning on-site system, floatable and settleable solids are separated from wastewater in the septic tank where anaerobic bacteria digest organic materials. The two wastewater quality parameters most reduced in a septic tank are the 5-day Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS). Concentrations of BOD_5 and TSS in domestic raw wastewater can vary significantly, but are typically around 250 mg/l and 300 mg/l respectively. Estimates of removal efficiencies achieved in septic tanks vary. Published research indicates that septic tanks generally remove 50-percent of BOD_5 and 55-percent of TSS. Septic tanks are significantly less effective at removing nutrients. Typical nitrogen and phosphorous concentrations in raw wastewater are approximately 40 mg/l and 10 mg/l, respectively. Nitrogen reduction is usually about 10-percent and phosphorus is reduced by about 25-percent. Septic tanks remove virtually no pathogens from the wastewater, based on published research.

The SAS, typically leaching trenches, provide additional treatment by both filtration and biochemical action in the stone bed and surrounding soils. Pathogens and phosphorus are typically retained in the stone bed and soil; however, significant concentrations can still migrate to groundwater. Nitrogen migration tends to be a limiting factor for on-site systems since the environmental conditions required to achieve reduction of organic nitrogen are specific and rarely met.

The effectiveness of on-site systems is mainly dependent on soil and groundwater conditions on the site in which they are installed. The permeability of native soils, as measured by the soil percolation rates, dictates the area required for the SAS. Sites having tight soils with slow percolation rates will require a large SAS to assimilate the daily domestic wastewater flow. Consequently, property owners in neighborhoods with small lots containing tight soils often face significant difficulties in siting systems or repairing failed systems. Removal of nutrients and pathogens occurs almost exclusively in the unsaturated soil matrix. Once system effluent reaches groundwater, contaminants migrate and are not reduced. Consequently, depth to groundwater is a critical element for successful on-site treatment and disposal. Title 5 dictates a four-foot separation between the bottom of the SAS and seasonal high groundwater. Occasionally, the SAS must be raised or mounded to meet that requirement. In some instances, small pumps must be added to on-site systems to deliver effluent to a mounded SAS.

Although, conventional Title 5 systems require regular maintenance, many homeowners tend to neglect their systems. Microorganisms in the septic tank and in the SAS are responsible for decomposing organic matter. Harsh chemicals, such as drain openers and strong cleaners, can kill those organisms and reduce the effectiveness of treatment. The microorganisms cannot degrade complex organic materials such as

garbage, fats, and oils, so those materials should not be disposed of in the system. High flows can significantly reduce detention time in the septic tank and reduce the removal efficiency of solids, which may cause clogging problems in the SAS. Systems must be pumped at an interval that prevents solids from washing into the SAS but helps maintain adequate populations of microorganisms in the septic tanks.

The cost to replace a failed on-site system with a conventional Title 5 system varies over a wide range depending upon soils, depth to groundwater, site conditions, and lot geometry. Generally, replacement system costs are less than the cost of a new system and range between $8,000 and $20,000 (2006 dollars). Typical systems require pumping every three to five years at an average cost of $150 to $250 per pumping.

7.5.1.2 Innovative and Alternative Systems

Innovative and Alternative technologies are systems recognized by MA-DEP as providing at least the same treatment, if not better, as a conventional Title 5 system. I/A technologies generally use the same treatment processes that have been used in wastewater treatment facilities for a long time. The technologies are recognized by the MA-DEP as innovative and alternative, because they are a new concept in on-site wastewater treatment. Historically, cesspools and on-site systems have been used for individual home on-site treatment. I/A technologies may provide better treatment of wastewater than conventional systems, and therefore allow some sites that do not pass current Title 5 standards, to continue to use on-site treatment of wastewater. I/A technologies are sometimes a solution for existing homes that have high groundwater, or small lot sizes. Although the cost of an I/A replacement system generally ranges from $20,000 to $30,000 depending on site conditions and the type of technology, the construction cost can exceed $40,000. Operation and maintenance cost for I/A systems are also substantially more than conventional on-site systems. Typical I/A system maintenance costs are $350 per year and power consumption typically costs $200 per year. I/A systems must also be monitored quarterly for the first year of operation. Monitoring costs total $600 for the first year. Consequently, annual operations and maintenance costs of on-site systems can range from $200 to up to $1,150.

Some of the same I/A technologies can be used on a larger scale to treat and dispose of wastewater from several homes. Wastewater can be collected from individual homes and conveyed to a shared treatment unit and disposal system at a nearby site. Systems with discharges up to 10,000 gpd can be regulated under Title 5 and do not require a groundwater discharge permit. These cluster systems provide a nearby solution that pairs the operational control of a centralized system with the groundwater recharge characteristics of on-site solutions.

7.5.1.3 Management, Operation, Maintenance, and Administration

Inadequate maintenance of on-site systems can hurt their performance and pose a threat to public health and nearby resources. The Board of Health regulates the installation and repair of on-site systems per Title 5 requirements. The Board is also responsible for inspecting systems when properties are sold or when the Board receives evidence of a problem. However, individual owners are responsible for regular maintenance. Often, problems with on-site systems persist undetected or ignored for long periods of time.

A community must enact more stringent regulations than those associated with Title 5 if the community wishes to minimize the risk to public health and threats to environmental resources. The particular elements of those regulations would vary considerably with the goals of the community. When preparing a regulation, a community must balance the environmental benefits of the regulations with the additional financial burden on taxpayers and the administrative burden on the community's departments. A regulation could consist of any of the following examples:

- Requiring existing systems to be pumped at regular intervals as determined by the Board of Health;
- Requiring existing systems to be inspected and if necessary, repaired, or upgraded to meet Title 5 regulations; or
- Requiring certain failing systems to be upgraded with I/A technologies.

It is typically the responsibility of the local Board of Health to establish the regulation and implement it. A voluntary management plan could also be established. System owners could choose to be included in a Town database, and notified when their system requires pumping. A free inspection of the system's storage component (typically a septic tank) could also be included as an option to mandatory pumping.

Massachusetts communities that have enacted more stringent Board of Health regulations include Gloucester, Essex, Cohasset, and Yarmouth, and the regulations range from septage management plans to town-wide system inspection programs. The Gloucester Wastewater Management Plan originated in 1997 in response to a MA-DEP Administrative Consent Order (ACO) under the Clean Water Act and concern with coastal contamination from existing systems. The plan requires all systems in the City to be pumped every 3-½ years by an approved, licensed septage hauler, and a system function check is conducted at the time of pumping. If effluent breakout or ponding is discovered, or the liquid level in the storage component is above the outlet, the hauler notifies the Board of Health and a Title 5 inspection must be performed. The City conducted a study to investigate the coastal contamination issue, and identified seven Priority Drainage Areas in the City that are of the highest concern for contributing contamination. The plan also requires that all systems within these areas that are located within 50 feet of a wetland, waterway, or storm drain be subject to a Title 5 inspection. The inspection includes excavating a deep observation hole adjacent to the leaching area to assess high groundwater elevation. All cesspools within Priority Drainage Areas and 50 feet of a wetland, waterway, or storm drain must be eliminated also. Inspections within several of these Priority Drainage Areas were completed; however, inspections within other areas were terminated because the areas were scheduled to be sewered when a planned sewer extension to the Town of Essex was constructed. I/A technologies are only required in Gloucester when it is not feasible to upgrade a conventional system to Title 5 standards. There are approximately 160 I/A systems in Gloucester.

The Town of Essex implemented a regulated program similar to the Gloucester plan around 1998. The program was also initiated in response to a MA-DEP ACO, which required the Town to address widespread system failures. System failures in Essex are typically caused by high groundwater, severe soils, and shallow ledge. The program established seven priority areas, similar to Gloucester, and initiated system inspections within these areas. The Town had completed inspections within four areas; however, it discontinued the program for the remaining areas when the sewer extension plan to these areas was approved.

Cohasset proposed a comprehensive plan to upgrade all failing on-site systems in Town, which targeted areas with frequent failures and concerns of negative impacts to public health and resources. This plan was not approved because residents were opposed to utilizing public funds for private construction. The Town investigated other means of responding to this need, and adopted an On-site Wastewater Management Plan in 2000. The plan goals include protecting the environment, minimizing costs to owners, encouraging alternative and shared solutions, and implementing a systematic inspection, maintenance, and upgrade approach to extend the useful life of on-site systems. The plan is voluntary and requires users to pay an entrance fee, quarterly user fee, and a usage fee based on water consumption. There is an additional annual cost for I/A systems. Prior to entrance, the plan requires that users bring their system into full compliance with Title 5, and submit a certificate of compliance. Once a property is incorporated into the plan, it will remain in the plan until connected to a municipal sewer system. The plan finances and provides periodic septage pumping of the system as needed, system function checks and

maintenance, Title 5 inspection if needed, and design and upgrade of the system to meet Title 5 if required. In order for the Town to access system components and provide service, plan entrants must also grant an easement of their land which contains the system to the Town. This has concerned residents showing interest in joining the plan and consequently the plan did not have any users as of 2003. The Town has approximately 75 I/A systems currently in use. Cohasset relies on surface water as a public drinking water source; therefore, a Board of Health regulation was implemented in 2000 that requires the use of I/A technologies for existing system upgrades that are located within 400-feet of any named surface water body in Town. The regulation mandates that the I/A technologies utilized meet nitrogen removal performance criteria of 20 mg/l.

The local regulations in Yarmouth include a septage management plan. The Town constructed a regional septage treatment facility, which was completed around 1995, and received State and Federal funding for financing. The funding was contingent upon the Town implementing an on-site system maintenance component in their local regulations. The plan requires system owners to pump their system every four years, or receive a free inspection of the system storage component to determine the level of solids within and if pumping is necessary. The local Board of Health initiates this procedure by sending notice to the owner, and coordinating the inspection if it is requested. The Board has also established standard storage capacity criteria to determine if the system requires pumping. If during the inspection, the system is determined to be in need of maintenance such as pumping or upgrades, the Board of Health sends notice to the owner to perform the required maintenance within a timeline established by the Board. The plan does not include any regulations requiring use of I/A technologies unless it is to receive reduction in required setback distances or nitrate credit for construction on small lots, as allowed in Title 5. There are approximately 40 I/A systems in use in Yarmouth.

Each of these communities enacted more stringent Board of Health regulations to meet an objective or to overcome extreme circumstances. The situation in Gloucester and Essex is most evident with the concerns of threatening contamination, system failures, and enforcement actions. The environmental and geological conditions in both communities consist of sensitive coastal embayments, areas of critical environmental concern, and extensive ledge outcrops that pose severe limitations to on-site wastewater management. The geological conditions in Cohasset are similar to Gloucester and Essex, and there is a crucial need to protect drinking water resources in Cohasset from dense development. Yarmouth is another clear example of enacting stricter local regulations to meet an objective, which was to obtain funding to finance the regional septage treatment facility. Westminster is not facing a major contamination threat, area-wide on-site system failures, or extreme limitations that would require adopting more stringent regulations that include mandatory Town-wide system inspection programs. In addition, the Board of Health has indicated that I/A technologies have only been installed on a few occasions in Town. In those cases, I/A technologies were necessary to meet the more stringent requirements of the Westminster Board of Health regulations and not Title 5. However, subsurface conditions in Westminster can make on-site system maintenance a challenge and there are surface water bodies in Town that require protection. Therefore, Westminster may benefit from a septage management plan similar to the plan developed in Yarmouth.

A plan that requires system owners to pump their system every three to four years may receive support from Westminster residents if the plan includes a free inspection of the system storage component to determine if pumping is necessary. It is important that the plan include a means for assessing the condition of on-site systems in Town. At the time of the inspection, a brief functionality check of the system should be performed to determine if a full Title 5 inspection is needed. The owner would then be responsible for carrying out the Title 5 inspection. Also, a system function check can be conducted at the time of pumping by an approved, licensed septage hauler. If effluent breakout or ponding is discovered, or the liquid level in the storage component is above the outlet, the hauler notifies the Board of Health and a full Title 5 inspection is required. This type of plan would not require a significant amount of additional

technical and administrative support to operate. This type of On-Site Wastewater Management Plan appears to best meet Westminster's needs and should be evaluated in the alternatives analysis.

The Citizens Advisory Committee (CAC) for the CWMP has indicated that residents in Town have had difficulty locating licensed septage haulers and that the cost to have their systems pumped has increased during recent years. If septic tank pump-out costs are increasing, system owners are likely to reduce regular maintenance. The CAC expressed interest in evaluating the potential for constructing an in-town septage receiving facility. An in-town facility would reduce the distance haulers must travel to discharge septage and thereby reduce the cost of system pump-outs. If there is a substantial need for such a facility in the area, constructing a larger facility that also allows septage from systems located in neighboring communities could generate revenue for the Town. The on-site wastewater management approach does not require a local septage receiving facility; however, a facility would likely improve on-site system maintenance in Town and the support for a Town-administered On-Site Wastewater Management Plan. Therefore, an evaluation of the potential for constructing an in-town septage receiving facility is provided in Section 7.9, after screening the various wastewater management approaches.

7.5.2 Ratings of On-Site Solutions for Westminster's Needs Areas

The ratings for on-site solutions to serve the needs areas identified in Chapter 4 of the report depend on the type of on-site solutions considered and on the site conditions and resources within the needs areas. Compared to conventional Title 5 systems, I/A systems have higher costs, more stringent operational constraints, more complicated permitting requirements, and less certain reliability and performance. However, I/A systems have a lower contamination risk and less environmental impacts. Site conditions such as soil types and depth to groundwater directly affect capital costs and permitting requirements. Likewise, the presence of resources such as surface water bodies affects potential contamination risks and environmental impacts.

As discussed, a proposed plan that requires increased on-site system inspections or increased system replacement costs does not seem appropriate for Westminster at this time, and it may not gain support from residents. However, an option that implements an on-site wastewater management plan for regular on-site system maintenance through more stringent regulations appears to warrant investigation. This option would be based on current regulations that do not require construction of I/A systems or an on-going system inspection program.

Therefore, the current on-site alternative is essentially the status quo alternative, and the goal of the current on-site approach screening is to evaluate the current wastewater management approach for each needs area. The current on-site alternative does not prevent the use of I/A systems in Town, and they remain an available option in order to meet site constraints and the local regulations. However, according to the Board of Health, only three I/A systems have been necessary within Westminster, and typical upgrades do not require their use. In addition, it is not expected that residents would voluntarily install more expensive I/A systems to increase benefits to the environment, when a conventional system upgrade would meet Title 5 requirements. Further details regarding the on-site screening evaluations are provided in the following subsections, but in general the current on-site alternative will receive favorable scores for *cost*, since added system maintenance is not required. The current on-site alternative will also receive high scores for *political reality* since additional regulations will not be required. However, the alternative will receive low scores for *environmental impacts* as conventional systems can have negative impacts to the environment, and low scores for *contamination risk* as current regulations do not have a mechanism to detect failing on-site systems; consequently, there is a higher risk from systems operating under failure.

The on-site alternative involving additional local regulations assumes the Westminster Board of Health implements an On-Site Wastewater Management Plan similar to the example provided earlier in

subsection 7.5.1. This hypothetical plan was based on example plans from other communities, environmental and geological conditions in Town, and the character of existing on-site wastewater management in Westminster. The on-site wastewater management plan alternative will receive lower scores for *political reality* since regulations would need to be passed by the Board of Health and a public hearing would need to be held. However, the solution will receive higher scores for *contamination risk* as the plan provides a means of detecting failing systems in Town through periodic function checks.

7.5.2.1 Current On-Site Approach

The information generated during the Wastewater Needs Analysis was used to determine the feasibility of conventional Title 5 systems as the current on-site wastewater management approach for each needs area. This information was supplemented with additional information acquired from the local Board of Health and from additional site visits to further evaluate the continued use of on-site systems.

Table 7.4 lists the estimated installation cost and technical feasibility of installing conventional Title 5 systems for each of the needs areas based on the area's limitations and discussions with local on-site system designers and installers. The installation cost is meant to represent an average cost to either install a new system or replace/upgrade an existing system in an area. Areas where system costs are generally $13,000 or less were considered to be the least expensive areas in Town. Areas where costs are generally around $15,000 were considered to be typical for the Town. Areas where costs are generally around $17,000 were considered to be expensive, and areas that generally cost $20,000 or greater were considered to be most expensive. The table also lists the estimated age of on-site systems within each needs area acquired from the Board of Health installation database described in Chapter 4 of this report. The estimated age is based on an average of the predominant on-site system age within each area. Approximately 5 to 20-percent of the systems in each needs area have been upgraded since 1990, based on the database. However, age information is not provided for approximately 30 to 50-percent of the systems in each needs area. The Board of Health indicated that plans and inspection reports do not exist for these systems and that many of them were most likely constructed before the 1970s. The estimated number of systems for each area was determined based on the actual number of developed properties in each needs area. Needs Area 3 contains some properties that are currently sewered, so the number of existing systems is slightly less. Needs Area 17 contains one industrial establishment that is currently sewered.

Table 7.4
Estimated Installation Cost and Feasibility
of Conventional Title 5 Systems

Needs Area	Needs Area Name	Needs Assessment	Estimated Cost Range	Technical Feasibility	Total Number of Systems	Estimated Age
3	State Road East Industrial	Mixed	Most Expensive	Very Difficult	6*	1980s to Current
7	Bacon Street	Localized	Typical	Difficult	62	1960s to 1980s
10	Shady Avenue	Localized	Typical	Difficult	51	1960s to 1980s
11	State Road West	Mixed	Typical	Typical	13	1970s
14	Bakers Grove	Mixed	Expensive	Difficult	37	1960s to 1980s
15	East Wyman	Mixed	Expensive	Difficult	56	1970s
17	Eastern Westminster	Mixed	Most Expensive	Very Difficult	0	No Data
19	Lake Drive West	Mixed	Expensive	Difficult	41	1960s to 1980s
20	Lake Drive East	Mixed	Most Expensive	Very Difficult	32	1970s
21	Edro Isle	Mixed	Most Expensive	Very Difficult	75	1960s to 1980s
22	Lakewood Park	Mixed	Most Expensive	Very Difficult	65	1970s
23	Leino Park	Mixed	Most Expensive	Very Difficult	78	Mixed

*Needs Area 3 is an industrial area partially served by sewers; therefore, the total number of existing systems is less.

S E A used this data and specific site conditions to determine the feasibility of conventional systems in each needs area by determining scores for four categories of screening criteria. The categories include engineering criteria, environmental criteria, municipal criteria, and population criteria, and each category consists of several components, which are explained in the following sections. The scores for each of the screening criteria were determined using a common scale, which assigns a score of two for the most positive condition and a score of negative two for the worst condition.

7.5.2.1.1 Engineering Criteria

Engineering criteria evaluates the technical feasibility, operational constraints, reliability and performance, and cost of conventional on-site systems in each needs area.

7.5.2.1.1.1 Technical Feasibility

Scores were assigned to needs areas based on the level of difficulty to install conventional systems. This includes installing new systems for undeveloped parcels and replacing or upgrading existing systems for developed parcels. This data was acquired directly from the technical feasibility category in Table 7.4. For conventional systems, technical feasibility can vary widely depending on lot size and site limitations; however, most needs areas exhibit difficult constraints. Therefore, scores ranged from neutral to negative.

7.5.2.1.1.2 Operational Constraints

The difficulty of operating and maintaining conventional systems relates to the site conditions of each needs area; therefore, scores were assigned to needs areas based on site conditions present and technical

feasibility. Systems that have been installed on sites with many constraints tend to be more difficult to operate and maintain than systems installed on sites with minimal limitations. For example, some systems in areas of high groundwater may require a pump to discharge effluent from the septic tank to the SAS, which is an added operating component. However, the relative operational difficulty of conventional systems is low, so scores range from positive to neutral.

7.5.2.1.1.3 Reliability and Performance

If installed properly, conventional systems have a long history of reliability and good performance. Therefore, the potential for malfunction was considered low for conventional systems. A sewer collection system presents the highest level of documented reliability, and merits a positive score; therefore, conventional systems were assigned a neutral score. All needs areas except those with a very difficult technical feasibility were given neutral scores. Areas with a very difficult technical feasibility were assumed to have a potential for malfunction based on the difficulty of system installation and the potential for added system components and were assigned a negative score.

7.5.2.1.1.4 Cost

The cost to install or replace conventional Title 5 systems depends largely on site conditions, particularly soil type and site constraints. Costs in Westminster for conventional systems, including the SAS, can range from approximately $8,000 for lots with very favorable conditions to $20,000 for lots with poor conditions, based on discussions with local on-site designers and installers. This component of the cost analysis was obtained directly from the estimated cost category in Table 7.4 for each needs area. The cost of conventional systems that serve industrial users can vary widely depending on the type of industrial establishment. Since the costs are so variable, they were not estimated for needs areas that are strictly industrial (Needs Areas 3 and 17), but assumed to be very expensive compared with the costs of systems that serve residences and small businesses.

Long-term operations and maintenance costs comprise the second component of the cost analysis. It is assumed that the design life of conventional systems is approximately 20 years. Conventional Title 5 systems are relatively inexpensive to operate; therefore, a yearly operation and maintenance cost of $100 was estimated for all needs areas except those with a very difficult technical feasibility. A yearly operation and maintenance cost of $300 was estimated for these particular needs areas.

The screening criteria scores for cost depend on the costs of other approaches such as cluster and centralized. To determine the most cost-effective approach to wastewater management for each needs area, the cost of each approach must be compared to the costs of the other approaches. Consequently, the scores for this criterion are based on a comparison of the on-site cost estimates and the cost estimates for the other approaches detailed in this chapter.

7.5.2.1.2 Environmental Criteria

Environmental criteria evaluate the type of impact that conventional systems have on groundwater recharge, the surrounding environment, and potential risk of contamination from system failure in each needs area.

7.5.2.1.2.1 Groundwater Recharge

Currently, the needs areas utilize conventional systems; therefore, the on-site approach would not change the current groundwater recharge conditions. However, conventional systems provide a better recharge method than other approaches by distributing recharge evenly throughout needs areas, rather than concentrating recharge to a particular site. Consequently, the approach was assigned a positive score. The most positive condition would require augmenting the groundwater recharge in Town.

7.5.2.1.2.2 Environmental Impact / Benefits

Under normal operating conditions, conventional systems may have an impact on environmental resources. Resources within close proximity to needs areas such as surface waters are likely to be impacted. The type and density of development, as well as the site conditions, are factors in determining the potential for environmental impacts. Areas containing a significant amount of industrial development or zoned for industrial development were assumed to have the potential for negative impacts to resources, and were assigned negative scores.

Densely developed areas can contribute excessive nitrogen loading to the groundwater and can contaminate aquifers. Utilizing typical nitrogen concentrations of wastewater and nitrogen loading limits set forth in Title 5, areas with high development density were assigned negative scores for the potential of negative impacts to groundwater quality.

Densely developed areas that also consist of poor site conditions can pose negative impacts to nearby wetlands and surface water quality. These areas were assigned negative scores for the potential of negative impacts to these resources.

Needs areas that do not contain dense development and limiting site conditions were assigned neutral scores. There were not any environmental benefits identified by the on-site solution; therefore, no positive scores were assigned.

7.5.2.1.2.3 Contamination Risk

The potential risk of contamination, or environmental impact from malfunctioning conventional systems is dependent on a number of factors. These include system age, site conditions, technical feasibility, and maintenance. These characteristics were investigated for each needs area to determine the potential contamination risk. The estimated system age was acquired from Table 7.4. The centralized and regional approaches represent the lowest contamination risk, and merit positive scores; therefore, conventional systems in needs areas with low risk were assigned neutral scores. These areas consist of newer systems and decent site conditions. Areas with mainly older systems and poor site conditions were assigned negative scores for the potential risk of contamination.

7.5.2.1.3 Municipal Criteria

Municipal criteria evaluate the level of ownership and control, the legal liability, the permit requirements, and the political reality conventional systems hold for each needs area.

7.5.2.1.3.1 Ownership and Control

The on-site approach lacks the control of centralized treatment and disposal even if the Town assumes maintenance of the on-site systems. Due to the lack of centralized control, there is a potential risk of contamination; therefore, negative scores were assigned to all needs areas.

7.5.2.1.3.2 Legal Liability

On-site solutions do not present a legal liability for the Town; therefore, needs areas were assigned a neutral score.

7.5.2.1.3.3 Permit Requirements

Conventional systems require only Board of Health approvals. The relative permitting difficulty is low compared with other treatment and disposal approaches; therefore, positive scores were assigned to all needs areas except those with a very difficult technical feasibility. These areas were assumed to require more extensive permitting to install a conventional system and were assigned a neutral score. Areas with mainly large industrial users were also assumed to require more extensive permitting to install a conventional system and were assigned a neutral score.

7.5.2.1.3.4 Political Reality

The political reality of conventional systems is generally favorable because it maintains the current condition; however, it can vary based upon the technical feasibility of installation. The on-site approach will most likely be less favorable in needs areas with installation difficulty; consequently, neutral scores were assigned to areas with a difficult technical feasibility. Needs areas with a typical technical feasibility were assigned a positive score, and the remaining areas with easier technical feasibility were assigned higher positive scores.

7.5.2.1.4 Population Criteria

Population criteria evaluate the odor impacts and visual aesthetics impacts that conventional systems may have in each needs area.

7.5.2.1.4.1 Odor Impacts

The odor impacts associated with properly functioning on-site systems are minimal, but increase as systems fail. Overall, the on-site solution was assigned a positive score. Needs areas with severe localized conditions were assigned neutral scores based on the potential for odor impacts from failing systems and from systems requiring effluent pumps.

7.5.2.1.4.2 Visual Aesthetics

Conventional systems reside mostly underground. Therefore, positive scores reflecting low visual impacts were assigned to needs areas with a typical or easy technical feasibility. Needs areas with a very difficult technical feasibility were assigned negative scores based on the potential for visual impacts from necessary measures such as added system components, landscaping measures to accommodate replacement systems, and system mounding.

7.5.2.1.5 Current On-site Approach Screening Examples

The following examples of rating the current on-site approach are provided to assist in understanding the screening process methodology. As previously discussed, the scores range from two for the most positive condition to negative two for the worst condition. Three diverse needs areas were chosen represent different ratings. These areas are Needs Area 3 – State Road East Industrial, Needs Area 11 – State Road West, and Needs Area 22 – Lakewood Park.

7.5.2.1.5.1 Needs Area 3

The Wastewater Needs Analysis determined that Needs Area 3 - State Road East Industrial contains very little development. The area is zoned for industrial use and is adjacent to several resources. The area received a low preliminary assessment of overall wastewater need; however, its current zoning classification warrants investigation of alternative wastewater management approaches to protect the

environment. Table 7.4 indicates that typical on-site system installation costs for the area are the most expensive in Town, and that technical feasibility is very difficult due to the fact that industrial establishments require more complex on-site systems than residential dwellings. Existing systems in the area were constructed more recently.

The engineering criteria were assessed first. Since Needs Area 3 has a very difficult technical feasibility, a score of negative two was given for that criterion. Based on the difficulty of operating and maintaining a more complex industrial on-site system, the area received the lowest score for the operational constraints criterion. However, conventional systems have a relatively low operational difficulty, so scores range from positive to neutral. Therefore, Needs Area 3 received a score of zero for the operational constraints criterion. Since conventional systems have a documented history of reliability, but are not the most reliable approach available, they are assigned a score of zero for the reliability and performance criterion. However, areas with a very difficult technical feasibility, which includes Needs Area 3, were assigned a score of negative one. The cost to replace industrial on-site systems is highly variable, and is typically much more expensive than replacing residential systems. It is assumed that the cost can range from $30,000 to $500,000 or more. Because the area has a very difficult technical feasibility, an annual operation and maintenance cost of $300 was estimated. This cost can range up to $10,000 depending on the type of system. Therefore, the total estimated on-site approach cost, including the total 20-year operation and maintenance costs ranges from $36,000 upward. Scores for cost are dependant on a comparison of the estimated cost for this approach to costs for all other approaches. The total planning period cost of $36,000 or greater is very high when compared to the costs of the other alternatives. Therefore, the cost of the current on-site alternative for Needs Area 3 was assigned a score of negative two.

The environmental criteria were assessed next. Since the on-site approach does not change the groundwater recharge conditions, the area was assigned a score of one for the groundwater recharge criterion. Needs Area 3 contains mainly industrial development with the potential for much more. The area is also located adjacent to the Whitman River; therefore, a score of negative two was assigned for the environmental impact/benefits criterion. Since conventional systems have a low contamination risk, but do not provide the least amount of risk, they were assigned a score of zero. However, needs areas with significant limitations were assigned negative scores for this criterion. Needs Area 3 exhibits a very difficult technical feasibility and difficult maintenance requirements, which warrants a score of negative one for the contamination risk criterion. Areas with a greater degree of severity were assigned scores of negative two.

The municipal criteria were assessed next. Due to the lack of centralized control that the on-site approach provides, there is a potential risk of contamination; therefore, a score of negative one was assigned to Needs Area 3 for the ownership and control criterion. The on-site approach does not present a legal liability for the Town; therefore, the needs area was given a score of zero for the legal liability criterion. The relative permitting difficulty of the on-site approach is low, compared with other approaches. Areas with a very difficult technical feasibility, similar to Needs Area 3, were assumed to require more extensive permitting, and were assigned a score of zero. All other needs areas were assigned a score of one for the permitting requirements criterion. Since the on-site approach will most likely be unfavorable in needs areas where installing systems is difficult, a neutral score was assigned to Needs Area 3 for the political reality criterion. Areas where installing systems is not difficult were given a score of one.

The population criteria were assessed last. The on-site approach was assigned an overall score of one for the odor impacts criteria, including Needs Area 3, since conventional systems provide minimal impacts. Localized needs areas with a high severity were assigned a score of zero based on the potential for odor impacts from more complex systems or failing systems. The on-site approach was assigned an overall score of one for the visual aesthetics criteria, since conventional systems provide minimal impacts.

However, needs areas with a very difficult technical feasibility, such as Needs Area 3, were assigned a score of negative one based on the potential for visual impacts from necessary system installation measures or more complex systems.

7.5.2.1.5.2 Needs Area 11

The Wastewater Needs Analysis determined that Needs Area 11 - State Road West is substantially developed. The area is zoned for residential use and is adjacent to a significant amount of wetland resources. The area received a low preliminary assessment of overall wastewater need; however, conditions in the neighborhood immediately west of Tophet Swamp are more limiting and warrant investigation of alternative wastewater management approaches. Table 7.4 indicates that on-site system installation costs for the area are typical when compared with other areas of Town, and that technical feasibility is also typical. Specific cost and installation feasibility information was not available from local on-site system designers and installers for this area; therefore, a site investigation was conducted for the alternatives analysis evaluation. The results of the site visit show that there are several lots located on the north side of State Road West that have limited useable land for installation of an on-site system. Tophet Swamp encroaches on these properties and the lots slope downward proceeding north toward the swamp. However, these conditions were observed for the easternmost lots within the needs area. The conditions and size of the remaining lots suggest typical installation cost and feasibility based on the predominant geological conditions in Town.

First the engineering criteria were assessed. Since Needs Area 11 has a typical technical feasibility, a neutral score was given for that screening criterion. Needs Area 11 generally contains average site conditions; therefore, it received a score of two for the operational constraints criterion. Because the needs area has a typical technical feasibility, it was assigned a neutral score for the reliability and performance criterion. The median estimated system replacement cost for Needs Area 11 is $15,000. Because the needs area has a typical technical feasibility, an annual operation and maintenance cost of $100 was estimated. Therefore, the total estimated on-site approach cost, including the total 20-year operation and maintenance costs is $17,000. As described previously, scores for cost are dependant on a comparison of the estimated cost for this approach to costs for all other approaches, and a life-cycle cost of $17,000 is low. Therefore, the current on-site alternative for Needs Area 11 was assigned a score of one for the cost criterion.

The environmental criteria were assessed next. The needs area was assigned a score of one for the groundwater recharge criterion because on-site systems maintain the current recharge condition. Needs Area 11 does not contain commercial or industrial development, and it has a moderate development density. Since the bedroom density of the area is not high, and the cumulative impacts to the nearby resources are low, a neutral score was assigned for the environmental impact/benefits criterion. Needs Area 11 has some older systems, but it has a typical technical feasibility; therefore, it was assigned a neutral score for the contamination risk criterion based on a minimal potential for system malfunction and subsequent contamination.

The municipal criteria were assessed next. Due to the lack of centralized control the on-site approach provides, there is a potential risk of contamination; therefore, a score of negative one was assigned to Needs Area 11 for the ownership and control criterion. The on-site approach does not present a legal liability for the Town; therefore, the needs area was given a score of zero for the legal liability criterion. The relative permitting difficulty of the on-site approach is low, and Needs Area 11 has a typical technical feasibility; consequently, it was assigned a score of one for the permitting requirements criterion. Since the on-site approach will most likely be accepted in needs areas with a typical installation difficulty, a score of one was assigned to this needs area for the political reality criterion.

The population criteria were assessed last. The on-site approach was assigned an overall score of one for the odor impacts criterion, since properly functioning conventional systems provide minimal impacts. Since Needs Area 11 has a typical technical feasibility, it was assigned a score of one for the visual aesthetics criterion based on the expectation that there will not be visual impacts from system installations.

7.5.2.1.5.3 Needs Area 22

The Wastewater Needs Analysis determined that Needs Area 22 – Lakewood Park is entirely developed. The area is zoned for residential development and is adjacent to Wyman Pond. The area received a high preliminary assessment of overall wastewater need and supplemental data confirms that the needs area is a priority for improved wastewater management methods in Town. Table 7.4 indicates that typical on-site system installation costs for the area are the most expensive in Town, and that technical feasibility is very difficult due to the fact that there are numerous site limitations within the needs area. Existing systems in the area were predominantly constructed in the 1970s.

First the engineering criteria were assessed. Since Needs Area 22 has a very difficult technical feasibility, a score of negative two was given for that screening criterion. Needs Area 22 contains mixed site conditions and has a very difficult technical feasibility; therefore, it received a score of zero for the operational constraints criterion. Because the needs area has a very difficult technical feasibility, conventional systems were not considered as reliable as in an area with an easier technical feasibility, and were assigned a score of negative one for the reliability and performance criterion. The median estimated system replacement cost for Needs Area 22 is $20,000. Because the area has a very difficult technical feasibility, an annual operation and maintenance cost of $300 was estimated. Therefore, the total estimated on-site approach cost, including the total 20-year operation and maintenance costs is $26,000. As described previously, scores for cost are dependant on a comparison of the estimated cost for this approach to costs for all other approaches, and a life-cycle cost of $26,000 is average. Therefore, the current on-site alternative for Needs Area 22 was assigned a score of zero for the cost criterion.

The environmental criteria were assessed next. The needs area was assigned a score of one for the groundwater recharge criterion because on-site systems maintain the current recharge condition. Needs Area 22 contains dense residential development. The needs analysis determined the area has a high potential for both remote and localized problems. Both Wyman Pond and the local aquifer are threatened; therefore, a score of negative two was assigned for the environmental impact/benefits criterion. Needs Area 22 has mostly older systems prone to fail and a very difficult technical feasibility; therefore, it was assigned a score of negative two for the contamination risk criteria based on the potential for system malfunction and subsequent contamination.

The municipal criteria were assessed next. Due to the lack of centralized control the on-site approach provides, there is a potential risk of contamination; therefore, a score of negative one was assigned to Needs Area 22 for the ownership and control criterion. The on-site approach does not present a legal liability for the Town; therefore, the needs area was given a score of zero for the legal liability criterion. Although the relative permitting difficulty of the on-site approach is low, Needs Area 22 has a very difficult technical feasibility, and is assumed to require more extensive permitting, such as variances. Consequently, it was assigned a score of zero for the permitting requirements criterion. Since the on-site approach will most likely be unfavorable in needs areas with installation difficulty, a neutral score was assigned to Needs Area 22 for the political reality criterion.

The population criteria were assessed last. The on-site approach in this needs area was assigned an score of zero for the odor impacts criterion, since there is a possibility that conventional systems may cause odor impacts in areas with severe localized conditions. Since Needs Area 22 has a very difficult technical

feasibility, it was assigned a score of negative one for the visual aesthetics criterion based on the potential for visual impacts from necessary system installation measures.

7.5.2.1.6 Composite Scores

The numeric ratings for each of the needs areas were used to determine composite word scores for the current on-site approach as presented in Table 7.5.

Table 7.5
Current On-Site Approach
Composite Ratings

Needs Area	Needs Area Name	Needs Assessment	Total Number of Parcels	Engineering Criteria	Environmental Criteria	Municipal Criteria	Population Criteria
				Word Score	Word Score	Word Score	Word Score
3	State Road East Industrial	Mixed	18	Unfavorable	Unfavorable	Unfavorable	Neutral
7	Bacon Street	Localized	66	Favorable	Unfavorable	Neutral	Favorable
10	Shady Avenue	Localized	57	Favorable	Neutral	Neutral	Favorable
11	State Road West	Mixed	17	Favorable	Favorable	Favorable	Favorable
14	Bakers Grove	Mixed	40	Favorable	Unfavorable	Neutral	Favorable
15	East Wyman	Mixed	69	Favorable	Unfavorable	Neutral	Favorable
17	Eastern Westminster	Mixed	10	Unfavorable	Unfavorable	Unfavorable	Neutral
19	Lake Drive West	Mixed	49	Neutral	Unfavorable	Neutral	Favorable
20	Lake Drive East	Mixed	52	Unfavorable	Unfavorable	Unfavorable	Unfavorable
21	Edro Isle	Mixed	110	Unfavorable	Unfavorable	Unfavorable	Unfavorable
22	Lakewood Park	Mixed	98	Unfavorable	Unfavorable	Unfavorable	Unfavorable
23	Leino Park	Mixed	98	Unfavorable	Unfavorable	Unfavorable	Unfavorable

7.5.2.2 On-Site Wastewater Management Plan Approach

A hypothetical town-administered on-site wastewater management plan approach (OWMP), as described in subsection 7.5.1 is considered for evaluation. The ratings for the OWMP approach are similar to the current on-site approach ratings since conventional on-site systems will remain in use throughout the needs areas with additional maintenance requirements. Therefore the ratings for the OWMP approach are based on the ratings for the current on-site approach discussed previously in this section, and have been adjusted where appropriate.

7.5.2.2.1 Engineering Criteria

Engineering criteria evaluate the technical feasibility, operational constraints, reliability and performance, and cost of the OWMP approach for each needs area.

7.5.2.2.1.1 Technical Feasibility

Since conventional systems will continue to be the technology in use, the technical feasibility rating for the OWMP solution is generally the same as the rating for the current on-site solution. Therefore, scores for this approach remain the same as the current on-site approach.

7.5.2.2.1.2 Operational Constraints

The OWMP solution would require additional maintenance in all needs areas. The septage management component would require pumping at regular intervals, which would be an increased frequency for many system owners that do not practice regular pumping maintenance. Therefore, all scores were adjusted downward from the current on-site approach scores.

7.5.2.2.1.3 Reliability and Performance

The reliability and performance for the OWMP approach would be the same as the current on-site approach for needs areas since conventional systems would remain in place. Consequently, scores remain the same as the current on-site approach.

7.5.2.2.1.4 Cost

The OWMP solution may increase costs for owners within the needs areas. The septage management plan aspect would require regular pumping. However, the current on-site approach is rated assuming owners are pumping at regular four-year intervals or more. Therefore, regular maintenance costs under the OWMP approach should be similar to the current on-site approach. The administration costs of a similar program in Cohasset, Massachusetts translated to an annual user fee of approximately $200 for inspection and pumping of conventional systems, which is within the range of annual maintenance costs utilized for rating the current on-site approach. The OWMP may increase costs to owners through potential Title 5 inspections required from failing system function checks. There would most likely be many upgrades and repairs required at the inception of the plan. However, Title 5 inspection costs and potential upgrade and repair costs would be necessary when a home is sold. Consequently, the OWMP approach is not significantly increasing costs to owners, so the scores for cost were not adjusted from the current on-site approach scores.

7.5.2.2.2 Environmental Criteria

Environmental criteria evaluate the type of impact that the OWMP approach has on groundwater recharge, the surrounding environment, and potential risk of contamination in each needs area.

7.5.2.2.2.1 Groundwater Recharge

The OWMP solution would have the same effect on groundwater recharge as the current on-site solution; therefore, the ratings for each needs area are the same as the current on-site solution.

7.5.2.2.2.2 Environmental Impact / Benefits

The environmental impact of the OWMP approach would be the same as the current on-site approach within the needs areas. Consequently, scores remain the same as the current on-site approach.

7.5.2.2.2.3 Contamination Risk

The OWMP approach would lessen the potential for contamination risk to all needs areas. The septage management aspect would assist the Town in locating and repairing malfunctioning systems through function checks during pump-outs and inspections of the septic tanks. It would require full Title 5 inspection of systems that fail the function checks. Consequently, scores were adjusted upward for all areas.

7.5.2.2.3 Municipal Criteria

Municipal criteria evaluate the level of ownership and control, the legal liability, the permit requirements, and the political reality that the OWMP approach holds for each needs area.

7.5.2.2.3.1 Ownership and Control

Although ownership would not change from the current on-site approach, the OWMP approach would increase the control aspect for all needs areas. The septage management plan component would provide the Town with control of system pumping throughout Town and identifying failing systems. Therefore, scores were adjusted upward for all areas.

7.5.2.2.3.2 Legal Liability

The legal liability of the OWMP approach is less favorable than that of the current on-site approach. There would be potential for residents taking legal action against the Town in objection to the mandated pumping schedule. This additional liability translates to lower scores than those for the current on-site approach for each needs area.

7.5.2.2.3.3 Permit Requirements

The permit requirements for the OWMP solution would be the same as the current on-site solution for all needs areas utilizing conventional systems. Therefore, scores for this approach remain the same as the current on-site approach.

7.5.2.2.3.4 Political Reality

The political reality of the OWMP approach would most likely be similar to the current on-site approach for all needs areas. A septage management plan that requires scheduled system pumping with function checks may receive opposition. However, the experience in Yarmouth showed that owners were more accepting of the plan if it includes an optional inspection of the storage component to determine if pumping is needed. Consequently, it was assumed that revised Board of Health regulations would not be opposed and the scores for this approach were kept the same as the current on-site solution.

7.5.2.2.4 Population Criteria

Population criteria evaluate the odor impacts and visual aesthetics impacts that the OWMP approach may have in each needs area.

7.5.2.2.4.1 Odor Impacts

The odor impacts of the OWMP would most likely be the same as the current on-site approach for most needs areas, since conventional systems would remain in use. Therefore, scores for all needs areas remain the same as the current on-site approach.

7.5.2.2.4.2 Visual Aesthetics

The OWMP approach would not have increased visual impacts to the needs areas utilizing conventional systems. Consequently, the scores for this approach remain the same as the current on-site approach.

7.5.2.2.5 Composite Scores

The numeric ratings for each of the needs areas were used to determine composite word scores for the Town-administered OWMP approach as presented in Table 7.6.

Table 7.6
OWMP Approach
Composite Ratings

Needs Area	Needs Area Name	Needs Assessment	Total Number of Parcels	Engineering Criteria	Environmental Criteria	Municipal Criteria	Population Criteria
				Word Score	Word Score	Word Score	Word Score
3	State Road East Industrial	Mixed	18	Unfavorable	Unfavorable	Unfavorable	Neutral
7	Bacon Street	Localized	66	Neutral	Neutral	Neutral	Favorable
10	Shady Avenue	Localized	57	Neutral	Favorable	Neutral	Favorable
11	State Road West	Mixed	17	Favorable	Favorable	Favorable	Favorable
14	Bakers Grove	Mixed	40	Neutral	Neutral	Neutral	Favorable
15	East Wyman	Mixed	69	Neutral	Neutral	Neutral	Favorable
17	Eastern Westminster	Mixed	10	Unfavorable	Unfavorable	Unfavorable	Neutral
19	Lake Drive West	Mixed	49	Unfavorable	Neutral	Neutral	Favorable
20	Lake Drive East	Mixed	52	Unfavorable	Unfavorable	Unfavorable	Unfavorable
21	Edro Isle	Mixed	110	Unfavorable	Unfavorable	Unfavorable	Unfavorable
22	Lakewood Park	Mixed	98	Unfavorable	Unfavorable	Unfavorable	Unfavorable
23	Leino Park	Mixed	98	Unfavorable	Unfavorable	Unfavorable	Unfavorable

7.6 Regional Approach Screening

As detailed in Chapter 2 of the report, Westminster discharges wastewater to the City of Fitchburg for treatment and disposal. Recent discussions with the Fitchburg DPW indicated that the City anticipates there will be additional wastewater treatment capacity available for Westminster in the near future. Consequently, the Fitchburg wastewater system affords the Town a regional approach that would not require the construction or expansion of a wastewater treatment facility.

Needs Area 10 would require a very long sewer extension to connect to existing sewer in Westminster under the regional approach to Fitchburg. However, it is located within close proximity to the City of Gardner town-line. Therefore, S E A investigated the potential for discharging wastewater to Gardner for treatment and disposal. The Gardner DPW Director indicated that the Gardner sewer system terminates near the Westminster town-line and that there is available capacity at the Gardner Wastewater Treatment Facility. Therefore, the regional approach is also a possibility for Needs Area 10 through the Gardner wastewater system.

7.6.1 Regional Wastewater Management Systems

The Whitman River Pump Station pumps wastewater from the Westminster sewer system to the Fitchburg sewer system and the Fitchburg interceptor sewer receives flow from the pump station and carries it to larger portions of the Fitchburg sewer system for eventual treatment and disposal. The pump station is currently at its maximum capacity and requires an upgrade to allow any new wastewater discharges, as detailed in Chapter 4 of the report. The interceptor sewer has a limited capacity that will likely be reached in the future. Therefore, implementation of the regional approach would require an upgrade to the Whitman River Pump Station and the Fitchburg interceptor in addition to construction of sewer collection systems to serve Westminster's needs areas. It would also require a revised wastewater intermunicipal agreement with the City of Fitchburg to allow an increased amount of wastewater flow from Westminster, as current wastewater flow is nearing the limit stipulated in the agreement.

The Gardner sewer system terminates within 1,700 linear feet of Westminster on Route 2A at Minott Road. The Gardner DPW Director indicated that the sewer in Route 2A is probably an 8-inch diameter sewer and it is at a shallow depth. Therefore, a low pressure sewer extension from Westminster may be necessary to connect to the Gardner system. The DPW Director identified that sewer system connection fees are similar to those required by Fitchburg. In addition, Gardner requires that proponents for large sewer connections (in excess of fourteen residences) make improvements to the sewer system downstream of the proposed connection as necessary. Required improvements are identified through hydraulic modeling performed by the Gardner DPW, and must be completed by the proponent prior to connection. Therefore, it is likely that a Westminster connection to the Gardner sewer system would require improvements to the downstream sewer system in Gardner.

For the purposes of the Wastewater Alternatives Analysis, S E A prepared a conceptual design of sewer collection systems to serve all of Westminster's needs areas. The conceptual layout of those sewer systems differed from past town-wide sewer plans as the conceptual sewers considered for the alternatives analysis were routed to serve only needs areas and were routed to avoid areas for which Title 5 has been determined to adequately meet the Town's goals as determined in this CWMP. Certain portions of Town located outside needs areas were included in the conceptual sewer areas if it was necessary to traverse through them to connect a needs area with the municipal sewer system. For example, sewer is required along a portion of Ellis Road to connect Needs Areas 19 and 20 with the extent of the municipal sewer system that terminates at the Westminster Country Club.

7.6.2 Ratings of Regional Solutions for Westminster's Needs Areas

Unlike the ratings for the on-site approach, which are closely related to geological and physical conditions within needs areas, the ratings for the regional approach for each needs area are generally uniform from area to area. The subsections below detail the various ratings for each of the screening criteria.

7.6.2.1 Engineering Criteria

Engineering criteria evaluates the technical feasibility, operational constraints, reliability and performance, and cost of the regional approach for each needs area.

7.6.2.1.1 Technical Feasibility

Construction of sewers is a straightforward effort and is generally feasible anywhere. Physical obstructions such as ledge slow construction and increase cost, but do not prevent the technical feasibility of the regional option. The technical feasibility of the regional option for a needs area is directly related to its proximity to existing sewers. Although sewers designed to serve other needs areas may provide extensions to more remote needs areas, S E A has assigned scores in the technical feasibility criterion based on a needs area's dependence on long sewer extensions to gain access to the regional solution. Areas adjacent or near to existing sewers were assigned positive scores, areas requiring short extensions were assigned neutral scores, and areas requiring long extensions were assigned slightly negative scores.

7.6.2.1.2 Operational Constraints

Sewer collection systems require minimal effort to sustain proper operation and maintenance. In general, gravity sewers require the least effort and resources, low pressure systems require more effort and resources, and pump stations require the most effort and resources. Needs areas were assigned scores ranging from positive to neutral based on the number of pump stations and the extent of low pressure systems that are required to service those areas.

7.6.2.1.3 Reliability and Performance

Collection systems with regional treatment and disposal have proven to be extremely reliable and have proven performance. Consequently, positive scores were assigned to all areas.

7.6.2.1.4 Cost

Conceptual sewer systems, including gravity sewers, pump stations, force mains, and low-pressure sewer systems, were designed based on municipal assessors data and planning-level topography data. Costs to design and construct those systems were estimated based on the length of gravity sewers, the length of force mains, the length of low-pressure sewers, the presence or absence of ledge, the estimated depth of pipe, the number of grinder pumps, and the number and size of pump stations required to serve Westminster's needs areas.

Upgrading the Whitman River Pump Station and the Fitchburg interceptor will be necessary to expand the regional approach to Fitchburg. An upgrade to the Narrows Road Pump Station will also be necessary to accommodate additional sewering in the eastern portion of Town. However, these upgrades are needed to meet current and future wastewater flow from the existing municipal sewer system (as detailed in Chapter 4). Therefore, the pump stations and the interceptor will require upgrades in the near future, regardless of the regional approach recommended in this CWMP. The current wastewater intermunicipal agreement with Fitchburg will require revision to increase the allowable wastewater flow amount that discharges to Fitchburg. The current agreement indicates that increased treatment capacity with Fitchburg will require an initial payment by Westminster based on the amount requested. Since the extent of upgrades, additional wastewater flow, and method of financing the upgrades are uncertain at this time, these cost impacts were not included in this analysis of the regional approach. Existing sewer system needs and

proposed sewer system expansion will be addressed together in the recommended plan portion of the CWMP once the Wastewater Alternatives Analysis conclusions are complete.

A regional approach that discharges to Gardner will include required improvements to the Gardner sewer system based on the size of the proposed discharge and the results of hydraulic modeling performed by Gardner. Since the probable cost of the improvements is uncertain, a surcharge of 10-percent was added to the cost of the regional approach to Gardner. After the cost was calculated, this surcharge amount was verified to be within the range of costs anticipated for reasonable sewer repairs and upgrades based on the extent of additional wastewater flow from Needs Area 10.

The unit costs used to estimate the probable capital costs associated with extending sewers were developed based on recent construction costs for similar work. The unit costs include a planning level contingency of 20-percent to compensate for the lack of refined data and to provide adequate contingency to overcome potential construction obstacles. The design and construction engineering cost was estimated to be 20-percent of the unit costs, including contingency, and was added to these values to arrive at total unit costs. An average cost for individual sewer service connections and sewer connection fees were included in the total sewer system costs. Total sewer system costs for each needs area were then divided by the number of properties expected to receive sewer service in the area to determine a *sewer extension cost per-user* to better relate the regional approach cost to the cost of other approaches on an area by area basis. Estimated annual sewer user charges were added to the per-user capital cost for sewer construction to develop a total estimated cost of the regional solution for the 20-year planning period. Spreadsheets containing conceptual design information for each needs area such as estimated sewer system quantities, unit costs, total costs, the number of sewer users, and wastewater flow are included in Appendix D.

Needs Areas 3 and 17 are industrial areas that are only partially developed. The spreadsheet in Appendix D calculates costs per user for the approach based on the number of existing users and an estimate of future development from assumptions and current zoning requirements. The annul sewer use charge is dependent on the average daily flow from each establishment. The spreadsheet calculates this using the average industrial wastewater flow based on water use records in Westminster. The cost per user of this approach for these needs areas is dependent on the extent and type of future industrial development within each of the areas. Since this is highly variable, costs per user were not estimated for Needs Areas 3 and 17. It was assumed that since the existing municipal sewer system is adjacent to these needs areas, the construction cost per user of extending sewer to new industrial development in these needs areas would be economical.

Consistent with the rating of the other wastewater management approaches, scores were assigned to each needs area based on the range of expected costs. Needs areas with relatively low per-user planning period costs were assigned positive scores, whereas areas with relatively high per-user planning period costs were assigned negative scores.

7.6.2.2 Environmental Criteria

Environmental criteria evaluate the type of impact that the regional approach has on groundwater recharge, the surrounding environment, and potential risk of contamination in each needs area.

7.6.2.2.1 Groundwater Recharge

Currently, the needs areas utilize conventional systems that discharge effluent locally. The regional approach would convey wastewater to the City of Fitchburg East Plant and local groundwater discharge would be eliminated for needs areas served. Although the East Plant is within the same river basin as

almost all of the needs areas, there would be a water export between Nashua River Sub-Basins. Therefore, this approach was assigned negative scores for all needs areas.

7.6.2.2.2 Environmental Impact / Benefits

A regional approach removes wastewater effluent and performs treatment and disposal in an area that does not impact environmental and drinking water resources. Under normal operations, the environmental impacts of a regional approach are beneficial compared with the on-site approach since the threat to resources is eliminated. Consequently, positive scores were assigned to all needs areas for this criterion.

7.6.2.2.3 Contamination Risk

The contamination risk presented by the regional approach is less than that presented by on-site and cluster systems because treatment plants are operated, monitored, and maintained daily. With improved construction materials and methods, collection systems have a minimal risk of malfunction; therefore, positive scores were assigned to all needs areas for this criterion.

7.6.2.3 Municipal Criteria

Municipal criteria evaluate the level of ownership and control, the legal liability, the permit requirements, and the political reality of the regional approach for each needs area.

7.6.2.3.1 Ownership and Control

The regional approach maximizes centralized control of treatment and disposal. The Town maintains full ownership and control of the local collection system, and Fitchburg or Gardner maintains control of the intercepting sewers and the treatment facility. S E A assigned positive scores to all needs areas for this criterion.

7.6.2.3.2 Legal Liability

Legal liability of the regional approach is slightly worse than the on-site approach due to the Town's responsibility for maintaining the sewer collection system. However, the approach does not have the additional responsibility of operating and maintaining a centralized treatment facility; therefore, slightly negative scores were assigned to all needs areas.

7.6.2.3.3 Permit Requirements

The permit requirements of a regional approach will include a MA-DEP Sewer Extension Permit to extend the municipal sewer collection system. The regional approach will also likely require an ENF through the Massachusetts Environmental Policy Act (MEPA) depending on the length of required sewers and the amount of proposed wastewater discharge.

Additional discharges to the Fitchburg Wastewater Treatment Facility from needs areas located outside of the Nashua River Basin will require Inter-basin Transfer Act permitting. Needs Area 10 and a portion of Needs Area 19 are located outside the Nashua River Basin boundaries. However, the regional approach for Needs Area 10 involves discharging to the Gardner Wastewater Treatment Facility. Both Needs Area 10 and the Gardner facility are within the Millers River Basin; therefore, Inter-basin Transfer Act permitting is not necessary. The proposed transfer from Needs Areas 19 would be well under 1.0 mgd, which allows an application to the WRC for a Determination of Insignificance. This is a formal review process under the Act; however, it is more streamlined than a full review.

Industrial sewer users will likely be required to obtain a permit to discharge to either Fitchburg or Gardner. Industrial pretreatment is expected for users that discharge process industrial wastewater.

Based on the relative permitting difficulty of the regional solution, neutral scores were assigned to all needs areas.

7.6.2.3.4 Political Reality

In the past, the regional approach in Westminster has generally been supported. However, the political reality of the regional approach will be related to that of the on-site approach. Where implementation of on-site management is difficult, the regional approach will most likely be a favorable alternative. Where implementation of on-site management is easy, the regional approach will most likely be unfavorable. Moreover, the regional approach does not maintain or improve water balance within Nashua River Sub-Basins; therefore, it will not be favored by the Nashua River Watershed Association. It was assumed that the approach would be favored highly in industrial areas. Scores were assigned to needs areas ranging from neutral to positive based on the political reality of the on-site approach.

7.6.2.4 Population Criteria

Population criteria evaluate the odor impacts and visual aesthetics impacts that the regional approach may have in each needs area.

7.6.2.4.1 Odor Impacts

Collection systems typically do not generate odors. Occasionally, odors can occur if wastewater is detained for excessive lengths of time in pump stations or force mains, similar to the situation occurring in the southeastern portion of the Westminster sewer system. Contributing factors to the odor problem in this location are the configuration of the sewer system and the seasonal fluctuation in sewer discharges from the Wachusett Mountain Ski Area. Although this situation has been an issue for the Town, odor impacts from new sewers generally can be prevented from proper sewer system layout, operation, and maintenance. Therefore, a positive score was assigned to this criterion consistent with those scores assigned for functioning on-site systems.

7.6.2.4.2 Visual Aesthetics

With the exception of pump stations, all portions of a sewer system are underground. Therefore, a positive score was assigned to this criterion consistent with those scores assigned for less complex on-site systems.

7.6.2.5 Composite Scores

The numeric ratings for each of the needs areas were used to determine composite word scores for the regional approach as presented in Table 7.7.

Table 7.7
Regional Approach
Composite Ratings

Needs Area	Needs Area Name	Needs Assessment	Total Number of Parcels	Engineering Criteria	Environmental Criteria	Municipal Criteria	Population Criteria
				Word Score	Word Score	Word Score	Word Score
3	State Road East Industrial	Mixed	18	Favorable	Favorable	Favorable	Favorable
7	Bacon Street	Localized	66	Favorable	Favorable	Favorable	Favorable
10	Shady Avenue	Localized	57	Favorable	Favorable	Favorable	Favorable
11	State Road West	Mixed	17	Neutral	Favorable	Neutral	Favorable
14	Bakers Grove	Mixed	40	Neutral	Favorable	Favorable	Favorable
15	East Wyman	Mixed	69	Favorable	Favorable	Favorable	Favorable
17	Eastern Westminster	Mixed	10	Favorable	Favorable	Favorable	Favorable
19	Lake Drive West	Mixed	49	Favorable	Favorable	Favorable	Favorable
20	Lake Drive East	Mixed	52	Favorable	Favorable	Favorable	Favorable
21	Edro Isle	Mixed	110	Favorable	Favorable	Favorable	Favorable
22	Lakewood Park	Mixed	98	Favorable	Favorable	Favorable	Favorable
23	Leino Park	Mixed	98	Favorable	Favorable	Favorable	Favorable

7.7 Centralized Approach Screening

Minimizing water exports from local Nashua River Sub-Basins is an important goal of the CWMP. However, the on-site and cluster approaches may not be practical for many wastewater needs areas in Westminster. Consequently, the construction of an in-town centralized wastewater treatment facility with groundwater discharge is a possible solution for Westminster. The exploration of a surface water discharge from an in-town facility is not considered a potential option since groundwater recharge is the primary goal of an in-town facility. In addition, the permitting requirements and financial impacts of a surface water discharge from a new wastewater treatment facility are anticipated to be an issue. The *Report on Wastewater Collection and Disposal Facilities*, prepared by S E A in 1975, references an anti-degradation clause in the Nashua River Basin Plan that was published at that time. The clause prohibits new municipal surface water discharges from wastewater treatment facilities within the basin, which includes Westminster.

The centralized approach would require a collection system similar to that required for the regional approach. The centralized approach would also require acquisition of land for the construction of a treatment and disposal facility and a large soil absorption system. The treatment and disposal facility and disposal field would not necessarily need to be constructed on the same land parcel since treated effluent could be transported to a separate disposal site. The soils at the disposal site would preferably consist of sand and gravel with a high infiltration capacity. Prior to construction of a centralized facility, a full environmental review and mitigation plan would be required. While the cost to construct such a facility would be high, the environment would benefit from reduced pollutant loads and increased groundwater recharge.

This section explores and evaluates the centralized approach for Westminster. The first portion provides a brief overview of centralized treatment and disposal and explores options that would utilize the potential centralized treatment and disposal sites in Westminster. The sites summarized in this section were determined through the screening analysis detailed in Section 7.3 of this chapter. The second portion evaluates those centralized options for needs areas in Westminster.

7.7.1 Centralized Wastewater Management Systems

The application of the centralized approach for Westminster's needs areas would require the same sewer collection systems as the regional approach, but with an interceptor connection or diversion to a centralized treatment facility in lieu of a connection to Fitchburg or Gardner for treatment.

S E A performed detailed investigations to identify sites for centralized wastewater treatment and disposal facilities. Those efforts concluded that only three locations in Westminster, Sites A-30, A-43, and A-49, have potential for siting such facilities. Based on an understanding of the subsurface conditions in Westminster gained from the Wastewater Needs Analysis, many areas of Town consist of soil and groundwater conditions that are too restrictive for large-scale wastewater disposal. Extensive field investigations and analysis including test pits, percolation tests, test borings, monitoring wells, hydraulic loading tests, and groundwater simulations will be required to determine the actual capacity of each of those sites to accept a substantial groundwater discharge of treated wastewater. Prior to expending those efforts, it is appropriate to determine if the centralized approach is a preferred or feasible alternative compared to the other alternatives. Consequently, for the purposes of the Wastewater Alternatives Analysis, centralized wastewater management options evaluated in this section assume favorable conditions at the potential sites. Should the centralized alternative appear preferable, then the additional work to test the conditions at the sites is warranted. The analysis would then be refined with the results of the site investigations and compared against the other alternatives again.

S E A prepared conceptual designs of centralized systems at all three candidate centralized treatment and disposal sites for evaluation. The designs are displayed on Figures 7-4 through 7-6, which are attached at the end of this CWMP. The sites were considered to serve Westminster's needs areas and to potentially receive flow from existing sewered areas of Town, if there is adequate wastewater disposal capacity. This would require a centralized system with a design flow range of 0.30 mgd to 0.50 mgd (average flow), based on estimates of existing and future wastewater flow. The conceptual designs maintained setback distances from various features located on the sites, based on Title 5 regulations. Since centralized systems are much larger than on-site systems, more conservative setbacks were established for certain features as follows: A 100-foot construction setback from the site property lines was established for each site, as well as a 100-foot setback from wetlands. Wetlands were identified using the MassGIS DEP wetlands datalayer previously utilized in the Wastewater Needs Analysis chapter of this report and by visual observation made during site visits. A 100-foot setback from floodplain was established for each site using the FEMA flood insurance map data described in the existing conditions chapter of this report. The sites were verified for absence of other resources such as drinking water supply protection areas and species habitats, based on available mapping. The remaining site area was considered for construction of wastewater treatment systems and disposal areas.

Based on modern treatment facility design, a wastewater treatment system within the flow range considered for Westminster generally requires one to four acres of land for construction; therefore, two acres were assumed necessary and subtracted from the total useable land area prior to calculating disposal capacity. If the site consists of variable soil conditions, it was assumed the treatment system would be constructed within the most restrictive soils on site.

The potential wastewater disposal capacity was calculated for each site based on soil conditions. The soil conditions were investigated utilizing USGS surficial geology mapping and NRCS soil conditions mapping. Sites consisting of sand and gravel and soils with rapid percolation rates according to the NRCS were considered potentially favorable for large-scale wastewater disposal. Sites consisting of glacial till or soils with slow percolation rates according to the NRCS were considered potentially restrictive for large-scale wastewater disposal. Sites consisting of floodplain alluvium or soils subject to flooding, ponding, or wetness according to the NRCS were considered unsuitable for large-scale wastewater treatment and disposal. Disposal areas consisting of potentially favorable soil conditions were reduced in land area by 25-percent to account for the space required for system piping, components, and access. Disposal areas consisting of potentially restrictive soil conditions are likely to have high groundwater and poor soil conditions; therefore, they were reduced in land area by an additional 25-percent.

Treatment facilities typically include a reserve disposal area of an equal capacity in case the primary area fails. Under normal operations, effluent discharge from the treatment system can be alternated between disposal areas. Therefore, the conceptual designs assume the disposal area is divided into two areas of equal size.

Wastewater disposal loading rates typically range between 2 gallons per day per square foot (gpd/s.f.) of disposal area for sites with moderate soil conditions to 5 gpd/s.f. for sites with highly transmissive soils. Groundwater depth at the site is a significant factor in selecting appropriate loading rates also. For the purposes of this evaluation, wastewater disposal capacity was calculated using maximum allowable wastewater loading rates expected to gain MA-DEP approval. Sites with potentially restrictive soils were assigned a loading rate of 2 gpd/s.f. Sites with potentially favorable soils were assigned a loading rate of 4 gpd/s.f. Based on the conceptual designs and the wastewater loading rates applied, the following disposal capacities were estimated for each site as the maximum potential available:

- Site A-30: 300,000 gpd

- Site A-43: 700,000 gpd
- Site A-49: 900,000 gpd

To determine the actual capacity of each of these sites, extensive field investigations, hydraulic loading analyses, ground water modeling, and review by MA-DEP will be required. It is unlikely that these sites could assimilate the volumes of wastewater listed here. However, for the purposes of analyzing the centralized wastewater approach, these values will be provisionally adopted with the limitation that an actual centralized system for Westminster could accommodate substantially less flow than that shown here.

Sites A-30, A-43, and A-49 are generally located between Meetinghouse Pond and Wyman Pond. There is a variety of options for discharging wastewater to a centralized facility at these sites. However, additional wastewater infrastructure would be necessary for all options to convey wastewater to the facility. Wastewater from Needs Areas 14, 15, 21, 22, and 23 could be directed to these sites for disposal. A wastewater pump station would be required to transport wastewater from some of these needs areas to the site, while gravity sewers may be possible for some needs areas, depending on the selected site. Wastewater from Needs Areas 7, 10, 11, 19, and 20 could be directed to the sites through the municipal sewer system. A large wastewater pump station on Main Street would be required to transport wastewater from these needs areas and the Town Center sewer system to the site. It is not practical to divert wastewater to these sites from Needs Areas 3 or 17, or from portions of the municipal sewer system that are north of Route 2 based on the costs of the necessary infrastructure.

7.7.2 Ratings of Centralized Solutions for Westminster's Needs Areas

Ratings for the centralized approach are identical to those for the regional approach for most criteria. It is expected that a site selected to implement the centralized approach would meet or exceed the minimum physical requirements for a large-scale treatment and disposal facility; therefore, the technical feasibility scoring should not differ from the regional approach. The reliability and performance, environmental impact/benefits, and contamination risk criteria should essentially be the same as the regional approach, and possibly improved slightly with newer treatment technologies and operation-monitoring systems available. The level of ownership and control does not change whether the facility is owned and operated by Fitchburg or Westminster. Similar to the regional approach, the ratings for political reality are anticipated to be inversely related to those of the on-site approach. However, the centralized approach may gain additional support for its benefit to the Nashua River Watershed. Since the centralized approach includes a large facility, it could be assigned less favorable scores for the population criteria. However, site selection and facility layout includes proper setbacks from existing development intended to mitigate odor and visual impacts. Therefore, the scoring for these criteria remains the same as the regional approach. The centralized approach ratings vary from the regional approach as follows:

7.7.2.1 Operational Constraints

The Town of Westminster does not currently operate a wastewater treatment facility, and the regional solution would not require such a facility. Should a centralized approach be implemented, the Town would be responsible for the operation of a large facility, and dedicated operators and supervisors would be necessary. Therefore, scores for the centralized approach were adjusted negatively from the regional scoring to reflect that additional burden.

7.7.2.2 Cost

The centralized approach would require the construction of a treatment and disposal facility. This capital expenditure is in addition to the cost of the collection systems associated with the regional approach. Sites A-43 and A-49 are privately-owned and the Town would need to acquire them from the owner prior

to constructing a facility. There would also be some additional infrastructure needs to convey the collected wastewater to the facility site.

Based on construction costs for similarly sized facilities and typical site conditions, centralized treatment and disposal facilities generally cost $20 per gallon of treatment capacity (2006 dollars). Therefore, a facility with a capacity of 0.50 mgd would cost approximately $10 million to construct. This usually translates to a cost range of $4,000 to $5,000 per property served. The estimated facility cost includes the cost of acquiring a privately owned site based on the average assessed land value (2005) of Sites A-43 and A-49 with a 10-percent contingency on land value. It is likely that the Town would have to pay more than the assessed value to acquire one of the privately owned sites. The annual operations and maintenance cost of such a facility can range up to 5-percent of the construction cost or greater. However, the annual sewer user cost for the operation of an in-town centralized facility compared with the current sewer user costs for the regional approach with Fitchburg are minor; consequently, that difference was ignored.

For the purposes of the alternatives analysis, $4,500 was added to the regional approach per-user cost for each needs area, and scores were assigned consistent with the scores assigned for the other approaches.

7.7.2.3 Groundwater Recharge

The scores for the centralized approach for the groundwater recharge criterion were adjusted upward from the regional approach to reflect the groundwater recharge benefits of in-town disposal. The sites under consideration are all within the Flag Book Sub-Basin of the Nashua River. This sub-basin currently exhibits high stress based on the *Hydrologic Assessment of the Nashua River Watershed*, prepared by CDM. Therefore, the centralized approach would improve the stress conditions of this sub-basin, but a significant discharge would occur in a single location. This approach does not provide the benefit of distributing recharge evenly throughout needs areas like the on-site approach. Consequently, scores were only adjusted to neutral since the on-site approach is a positive condition that does not alter groundwater recharge conditions.

7.7.2.4 Legal Liability

Legal liability of the centralized approach is worse than the regional approach due to the Town's responsibility for maintaining both a sewer collection system and a centralized treatment facility; therefore, scores were adjusted downward from the regional approach for all needs areas.

7.7.2.5 Permit Requirements

The centralized approach would require all of the necessary permits of the regional approach, including an industrial pretreatment program for industrial users that discharge process industrial wastewater. In addition, an in-town treatment and disposal facility would require a Groundwater Discharge Permit from the MA-DEP that mandates strict water quality limits with frequent effluent and monitoring well testing; therefore, scores were adjusted downward from the regional scoring.

7.7.2.6 Composite Scores

The numeric ratings for each of the needs areas were used to determine composite word scores for the centralized approach as presented in Table 7.8.

Table 7.8
Centralized Approach
Composite Ratings

Needs Area	Needs Area Name	Needs Assessment	Total Number of Parcels	Engineering Criteria	Environmental Criteria	Municipal Criteria	Population Criteria
				Word Score	Word Score	Word Score	Word Score
3	State Road East Industrial	Mixed	18	Favorable	Favorable	Neutral	Favorable
7	Bacon Street	Localized	66	Neutral	Favorable	Unfavorable	Favorable
10	Shady Avenue	Localized	57	Neutral	Favorable	Unfavorable	Favorable
11	State Road West	Mixed	17	Unfavorable	Favorable	Unfavorable	Favorable
14	Bakers Grove	Mixed	40	Unfavorable	Favorable	Unfavorable	Favorable
15	East Wyman	Mixed	69	Favorable	Favorable	Unfavorable	Favorable
17	Eastern Westminster	Mixed	10	Favorable	Favorable	Neutral	Favorable
19	Lake Drive West	Mixed	49	Neutral	Favorable	Unfavorable	Favorable
20	Lake Drive East	Mixed	52	Neutral	Favorable	Unfavorable	Favorable
21	Edro Isle	Mixed	110	Neutral	Favorable	Unfavorable	Favorable
22	Lakewood Park	Mixed	98	Neutral	Favorable	Unfavorable	Favorable
23	Leino Park	Mixed	98	Neutral	Favorable	Unfavorable	Favorable

7.8 Cluster Approach Screening

Similar to the on-site approach, the cluster approach provides the benefit of local groundwater recharge. Cluster systems are large-scale on-site systems that serve a neighborhood at a nearby location. Cluster systems require small wastewater collection systems, but the wastewater treatment and disposal components are similar to those of I/A on-site systems. The collection system would be similar to that required for the regional approach except that it would convey wastewater from a needs area to a nearby treatment and disposal site. A site that consists of sand and gravel with adequate separation from groundwater must be acquired to construct treatment and disposal components with a soil absorption system.

Cluster systems are not allowed in Town under the Westminster Board of Health regulations (referred to as satellite systems). The regulations are intended to prevent construction of cluster systems by private entities. However, a Town-owned and operated cluster system intended to improve wastewater management in a particular area would not be in violation of the regulations. This approach places the burden of construction, permitting, and operation on the Town. Although the additional burden is undesirable, the cluster approach may be cost effective and beneficial for the Town to implement for an isolated wastewater needs area with a nearby undeveloped site for wastewater disposal.

Under certain circumstances, the cluster approach may also benefit the Town when implemented by private entities. The CWMP has documented that the municipal sewer system has reached hydraulic capacity and that there is limited disposal capacity remaining with Fitchburg. It has also documented that there are currently developed areas of Westminster in need of improved wastewater management, and these areas may be recommended as a priority for potential sewer extension plans. Westminster is also experiencing an increased rate of housing development, particularly affordable housing (Chapter 40B). Therefore, the cluster approach could be allowed as a wastewater management solution for proposed housing complexes to prevent further stress to the municipal sewer system. Ownership and operation would be the responsibility of the private entity and would not place additional burden on the Town. The Board of Health should evaluate potential modifications to the regulations to allow cluster systems where necessary to protect the municipal sewer system and facilitate development goals presented in the Westminster Draft Master Plan.

7.8.1 Cluster Wastewater Management Systems

The screening analysis detailed in Section 7.3 of this chapter identifies a total of seven sites with potential for locating cluster treatment and disposal systems. These include Sites A-22, A-30, A-33, A-40, A-43, A-46, and A-49. Similar to the centralized approach, extensive field investigations will be required to determine the actual capacity of each of those sites to support a cluster system. S E A utilized the same methodology as the centralized evaluation in screening the feasibility of the cluster approach compared with other alternatives prior to conducting substantial investigations of the potential sites. Therefore, the cluster system options evaluated in this section assume favorable conditions at the potential sites. If the alternatives analysis reveals that the cluster approach is preferable in certain areas, then additional site investigations will be necessary to further refine the analysis.

A cluster system with a design flow greater than 10,000 gpd requires a Groundwater Discharge Permit with MA-DEP. For design flows less than 10,000 gpd, the permitting is under the jurisdiction of Title 5. Using Title 5 flow guidelines, a system with a design flow of 10,000 gpd could serve thirty three-bedroom homes. It is unlikely that a cluster system of this size would be cost effective on a per user basis. In addition, each needs area with a nearby potential cluster site has significantly more than thirty homes. Based on the size of these needs areas, potential cluster systems evaluated in this section would range between 20,000 gpd and 45,000 gpd, and require Groundwater Discharge Permits.

S E A prepared conceptual designs of cluster systems at the potential sites that are most feasible for evaluation purposes. These include Sites A-33, A-40, A-43, A-46, and A-49. Sites A-22 and A-30 were not included since they are located further away from the nearest needs areas than other potential sites. These sites also have current or future recreational value to the Town. Therefore, there is less potential and greater cost to implement cluster systems on these sites. Sites A-22 and A-30 are Town-owned and are not being precluded from the cluster alternative, but they are not being evaluated any further for the previous reasons. The conceptual designs are displayed on Figures 7-7 through 7-11, which are attached at the end of this CWMP. The assumptions used in preparing the conceptual designs for the cluster approach are similar to those used for the centralized approach. However, the cluster approach utilizes systems of a much smaller size intended to serve smaller areas. Smaller systems pose less aesthetic impacts and potential odor impacts; consequently, the construction setback from the site property lines was reduced to 50-feet for the cluster approach; all other setbacks remained the same. The sites were verified for absence of other resources such as drinking water supply protection areas and species habitat, based on available mapping.

Based on recent system design, the treatment facility portion of a cluster system within the flow range considered for Westminster generally requires 5,000 s.f. to 15,000 s.f. of land for construction; therefore, 10,000 s.f. was assumed necessary and subtracted from the total useable land area prior to calculating disposal capacity. If the site consists of variable soil conditions, it was assumed the treatment system would be constructed within the most restrictive soils on site.

The soil conditions of the sites were investigated using the same approach as the centralized approach screening. Disposal areas for cluster systems that consist of potentially favorable soil conditions were reduced in land area by 25-percent. Disposal areas consisting of potentially restrictive soil conditions were reduced in land area by 50-percent.

A reserve disposal system was included in the conceptual designs for the cluster approach. Therefore, the conceptual designs assume the disposal area is divided into two areas of equal size. Similar to the centralized approach evaluation, wastewater disposal capacity was calculated using maximum allowable wastewater loading rates expected to gain MA-DEP approval. Sites with potentially restrictive soils were assigned a loading rate of 2 gpd/s.f. Sites with potentially favorable soils were assigned a loading rate of 4 gpd/s.f.

Based on the conceptual designs and the wastewater loading rates applied, the following disposal capacities were estimated for each site:

- Site A-33: 90,000 gpd
- Site A-40: 50,000 gpd
- Site A-43: 120,000 gpd
- Site A-46: 20,000 gpd
- Site A-49: 180,000 gpd

To determine the actual capacity of each of these sites, extensive field investigations, hydraulic loading analyses, ground water modeling, and review by MA-DEP will be required. These estimated capacities are highly favorable; however, for the purposes of analyzing the cluster wastewater approach, these values will be provisionally adopted with the limitation that an actual cluster system for Westminster may not accommodate the flow shown here.

Site A-33 could potentially provide wastewater management for Needs Area 23. The estimated wastewater flow for Needs Area 23 is approximately 19,000 gpd based on the calculations in the conceptual design spreadsheet located in Appendix D. The spreadsheet utilizes existing water use records to estimate existing wastewater flow and Title 5 flow guidelines with an assumption of three bedrooms per home to estimate future flow. This section estimates that there is adequate disposal capacity at Site A-33 to accommodate current and future development in Needs Area 23. In addition to a cluster system at Site A-33, the alternative would also require construction of a collection system similar to the system required for the regional alternative.

Site A-40 could potentially provide wastewater management for Needs Area 10. The estimated wastewater flow for Needs Area 10 is approximately 15,000 gpd based on the calculations in the conceptual design spreadsheet (Appendix D). This section estimates that there is adequate disposal capacity at Site A-40 to accommodate current and future development in Needs Area 10. In addition to a cluster system at Site A-40, the alternative would also require construction of a collection system similar to the system required for the regional alternative.

Site A-43 could potentially provide wastewater management for Needs Areas 14 and 15. Depending on the size and configuration of the cluster system, Site A-43 could also potentially provide economical wastewater management for Needs Areas 21 and/or 22. The estimated wastewater flow for Needs Areas 14 and 15 totals approximately 31,500 gpd based on the calculations in the conceptual design spreadsheet (Appendix D). This section estimates that there is adequate disposal capacity at Site A-43 to accommodate current and future development in Needs Areas 14 and 15 and possibly Needs Areas 21 and 22 also. In addition to a cluster system at Site A-43, the alternative would also require construction of collection systems similar to the systems required for the regional alternative.

Site A-46 could potentially provide wastewater management for Needs Area 21. The estimated wastewater flow for Needs Area 21 is approximately 20,500 gpd based on the calculations in the conceptual design spreadsheet (Appendix D). This section estimates that the disposal capacity at Site A-46 is slightly less than the estimated wastewater flow from the needs area. The spreadsheet estimates a significant wastewater flow from potential future development in the area. Therefore, application of the cluster approach to this needs area at Site A-46 would require a limitation on the number of future connections to prevent exceeding the capacity of the cluster system. Additional future development would be required to utilize the on-site approach. In addition to a cluster system at Site A-46, the alternative would also require construction of a collection system similar to the system required for the regional alternative.

Site A-49 could potentially provide wastewater management for Needs Areas 21 and 23. The estimated wastewater flow for Needs Areas 21 and 23 is approximately 39,500 gpd based on the calculations in the conceptual design spreadsheet (Appendix D). This section estimates that there is adequate disposal capacity at Site A-49 to accommodate current and future development in these needs areas. In addition to a cluster system at Site A-49, the alternative would also require construction of a collection system similar to the system required for the regional alternative.

7.8.2 Ratings of Potential Cluster Solutions for Needs Areas

Ratings for the cluster approach follow those for the centralized approach; however, certain ratings exhibit similarities to the on-site approach ratings since the scale of a typical cluster system ranges between on-site and centralized.

Potential cluster sites would be verified for suitability prior to constructing a treatment and disposal facility; therefore, the technical feasibility scoring should not differ from the centralized approach. Under

the cluster approach, the Town would be responsible for the operation of one or several small facilities; therefore, scores for the operational constraints criterion follow those of the centralized approach. A cluster system with a MA-DEP Groundwater Discharge Permit would utilize proven treatment and disposal technology that meets the same effluent quality as a centralized system. Therefore, the reliability and performance and environmental impact/benefits criteria are anticipated to be the same as the centralized approach. The level of ownership and control does not change whether the Town-owned facility is a large scale centralized or small-scale cluster system. The legal liability of the cluster approach is the same as the centralized approach due to the Town's responsibility for maintaining both sewer collection systems and wastewater treatment facilities. The only difference between the permitting requirements for the cluster and centralized approaches is that the cluster approach would not require an industrial pretreatment program for industrial users since the approach is not being explored for needs areas with industrial development. This difference was assumed to be negligible and the scoring remained the same as the centralized approach. The cluster approach ratings vary from the centralized approach as follows:

7.8.2.1 Cost

The cluster approach could involve multiple scenarios. Depending on the potential facility site, a single treatment and disposal facility could be constructed to serve several needs areas, but smaller sites with limited capacity could only support a facility that serves one needs area. It is expected that there would be an economy of scale associated with constructing a larger cluster facility on a site such as A-43 to serve several needs areas. Consequently, this cost analysis considers these scenarios by evaluating a range of costs for the cluster approach.

The cost of cluster treatment and disposal facilities is in addition to the cost of sewer collection systems similar to those developed for the regional approach. Sites A-40, A-43, A-46, and A-49 are privately-owned; therefore, if they were selected, the Town would need to acquire them from the owner prior to constructing a facility. There would also be some additional infrastructure needs to convey the collected wastewater to the facility site.

Based on construction costs for similarly sized facilities and typical site conditions, cluster treatment and disposal facilities generally cost $30 to $40 per gallon of treatment capacity (2006 dollars). Therefore, using a cost of $35 per gallon, a facility with a capacity of 35,000 gpd would cost approximately $1.23 million to construct. For a cluster facility with a capacity of approximately 20,000 gpd, this usually translates to a cost range of $9,000 per property served. For a cluster facility with a capacity of approximately 50,000 gpd, this usually translates to a cost range of $6,750 per property served. The estimated facility cost includes the cost of acquiring a privately owned site based on the average assessed land value (2005) of Sites A-40, A-43, A-46, and A-49 with a 10-percent contingency on land value. For large sites, it was assumed that only the land needed for a cluster facility could be subdivided and purchased from the owner as a percentage of the total land value. It is likely that the Town would have to pay more than the assessed value to acquire one or more of the privately owned sites. The annual operations and maintenance cost for cluster facilities is similar to that for centralized facilities. Consequently, the annual sewer user cost for the regional approach was carried in the planning period cost for the cluster approach.

For the purposes of the alternatives analysis, the most economical scenario was considered for each needs area and costs were assigned using the range previously developed. Needs Area 10 is limited to a small cluster system at Site A-40 (under 20,000 gpd) based on this size of the needs area; therefore, $9,000 was added to the regional approach cost for this needs area. The regional approach cost for Needs Area 10 includes a surcharge of 10-percent to account for required improvements to the Gardner sewer system under the regional approach, as detailed in Section 7.6. This surcharge was removed for the cluster

approach. Needs Areas 14, 15, and 22 would utilize a large cluster system at Site A-43 (approximately 50,000 gpd); therefore, $6,750 was added to the regional approach cost for these needs areas. Needs Areas 21 and 23 would utilize a large cluster system at Site A-49 (approximately 40,000 gpd); therefore, $7,500 was added to the regional approach cost for these needs areas. Scores were assigned consistent with the scores assigned for the other approaches.

7.8.2.2 Groundwater Recharge

The groundwater recharge characteristics of this approach are generally similar to the centralized approach, since a significant discharge would occur in a single location. It also exhibits similarities to the on-site approach recharge characteristics since the discharge would occur near the needs area and the cluster approach would not transfer wastewater out of river basins or sub-basins. Consequently, the approach would not improve the stress conditions of the Flag Book Sub-Basin of the Nashua River. Based on these considerations, the scores for the cluster approach for the groundwater recharge criterion should follow those for the centralized approach.

7.8.2.3 Contamination Risk

The contamination risk presented by the cluster approach is less than that presented by on-site systems because MA-DEP regulations require a monitoring and maintenance agreement for shared systems. It is not as minimal as the centralized approach because cluster systems will not utilize full-time staff and have the same operation-monitoring systems as a centralized facility. Therefore, scores were adjusted downward from the centralized approach to neutral for this criterion.

7.8.2.4 Political Reality

The cluster approach may not gain the same level of support as the regional or centralized approaches since the cluster treatment and disposal facility would be located within or adjacent to the neighborhood which it serves. The approach maintains water balance within Nashua River Sub-Basins; therefore, it should not be opposed by the Nashua River Watershed Association. Scores were adjusted downward from the centralized approach scoring for this criterion.

7.8.2.5 Population Criteria

It is possible that the scoring for these criteria could follow that of the centralized approach; however, the cluster approach would be located closer to existing neighborhoods, with smaller setbacks from development than the centralized approach. Visual impacts are likely and there is greater potential for odor impacts to the users located nearby. Therefore, the scoring for these criteria was adjusted downward from the centralized approach.

7.8.2.6 Composite Scores

The numeric ratings for each of the possible needs areas were used to determine composite word scores for the cluster approach as presented in Table 7.9.

Table 7.9
Cluster Approach
Composite Ratings

Needs Area	Needs Area Name	Site No.	Location	Engineering Criteria	Environmental Criteria	Municipal Criteria	Population Criteria
				Word Score	Word Score	Word Score	Word Score
10	Shady Avenue	A-40	12 Park Street	Neutral	Favorable	Unfavorable	Neutral
14	Bakers Grove	A-43	Narrows Road/ Laurelwood Drive	Unfavorable	Favorable	Unfavorable	Neutral
15	East Wyman	A-43	Narrows Road/ Laurelwood Drive	Favorable	Favorable	Unfavorable	Neutral
21	Edro Isle	A-49	Worcester Road/ Honey Bee Lane	Unfavorable	Favorable	Unfavorable	Neutral
22	Lakewood Park	A-43	Narrows Road/ Laurelwood Drive	Neutral	Favorable	Unfavorable	Neutral
23	Leino Park	A-49	Worcester Road/ Honey Bee Lane	Unfavorable	Favorable	Unfavorable	Neutral

7.9 Septage Receiving Facility Evaluation

During the Wastewater Needs Analysis phase of the CWMP, the CAC expressed an opinion that the cost to have septic tanks pumped in Westminster is high. It was suggested that there may be a lack of septage receiving facilities in the region, which could cause local septage haulers to charge more per pump-out. If local septage hauler's fees are high, then on-site system owners may avoid pumping at recommended intervals. The reduced maintenance is detrimental to the performance and life of systems, and could ultimately cause system failure. In addition, if Westminster implemented a town-administered on-site wastewater management plan that requires system owners to pump every three to four years, it would surely receive more opposition if the cost to owners is high.

The wastewater treatment facilities in Fitchburg, Leominster, and Gardner include septage receiving; however, the Gardner facility only accepts septage originating from on-site systems in Gardner. Leominster currently accepts up to 10,000 gpd of septage from within the City and from adjacent communities. The Health Agent indicated that the City may consider not accepting septage from outside Leominster in the future. Fitchburg accepts approximately 100,000 gpd to 200,000 gpd of septage from the region. However, Fitchburg is under a MA-DEP Administrative Consent Order that does not allow septage receiving when flows are high. High flows occur during storms due to a significant I/I problem in the Fitchburg sewer system. The Leominster facility charges septage haulers $0.05 per gallon to dispose of septage and the Fitchburg facility charges $0.07 per gallon (as of 2006). The Town of Templeton has a septage receiving facility that was accepting up to 100,000 gpd of septage from the region in the past; however, it discontinued a few years ago while the Templeton wastewater treatment facility was under construction. The wastewater treatment facility superintendent indicated that Templeton will begin accepting septage again in 2006 at a rate of $0.065 per gallon up to 50,000 gpd.

In order to improve septage management for its residents, Westminster could construct an in-town septage receiving facility to supplement the other regional facilities. This option would have a high capital cost and a moderate operations cost. The Town could also create a septage management district in Town to regulate and administer the actual pumping of septic tanks. This option would require additional administrative and operations effort from the Town. The users would pay a reoccurring fee for the pumping service, which may be opposed by some residents. The operational requirement of these options could be performed by Town personnel or by a private entity outsourced by Westminster.

It appears that another septage receiving facility would be helpful to the region; however, it is not certain if it would reduce pump-out costs for system owners. S E A interviewed five local septage haulers registered with the Westminster Board of Health to gain an understanding of the septage treatment needs of the region. Four of the haulers expressed an opinion that a Westminster facility would be beneficial to allow more options to haulers. The other hauler indicated that disposing of septage in the region was not difficult. The selected haulers charge customers between $220 and $300 for a residential pump-out (1,500 gallon septic tank). These costs are generally within the range observed in other areas of Massachusetts.

7.9.1 Septage Treatment Options

A septage receiving facility is simpler to construct if it discharges to a wastewater treatment facility. The Westminster sewer system discharges to the Fitchburg wastewater treatment facility. However, the wastewater intermunicipal agreement with Fitchburg does not allow Westminster to discharge septage into the Fitchburg sewer system. The Fitchburg wastewater treatment plant operator indicated that it is not likely that Fitchburg would modify the agreement to allow Westminster to discharge septage. It would take potential revenue away from the Fitchburg facility and the additional septage load from Westminster could cause operational difficulties at the Fitchburg treatment facility. At a minimum, Westminster would be required to adhere to the stipulations of the MA-DEP Administrative Consent

Order that prevents discharge of septage to the Fitchburg treatment facility during high sewer flows. This would negate the benefit of having another regional septage facility, as cited by the haulers. Consequently, Westminster would have to construct an independent septage treatment facility that treats and disposes of septage. The only disposal option available to the Town is a groundwater discharge at a potential treatment and disposal site identified in Section 7.3 of this chapter.

Westminster could construct a regional septage facility to accept significant septage quantities from other nearby communities in addition to Westminster. The benefit to the Town of a regional facility is that it could be a long-term source of revenue for Westminster. However, a regional facility must have a large capacity to accept septage from other communities (greater than 10,000 gpd), which would be more expensive to construct and operate, and more difficult to permit. Examples of regional facilities include the Wayland-Sudbury Septage Facility, the Tri-Town Septage Facility (Orleans, Eastham, Brewster), and the Yarmouth-Dennis Septage Facility.

Since there are large treatment facilities in Leominster, Fitchburg, and Templeton that accept septage from the region, a small septage receiving facility appears more appropriate for Westminster. It could accept primarily in-town septage and small amounts from adjacent communities. The required capacity of an in-town facility can be estimated based on the approximate number of on-site systems in Town and the septic tank size for new Title 5 systems. To be conservative, it was assumed that owners would pump their septic tanks every three-years. Using growth projections from Chapter 1, the required capacity can be estimated for the 20-year planning period. Based on this information, the minimum capacity of an in-town facility should be 5,700 gpd, which includes a 25-percent contingency to account for growth variations and commercial on-site systems.

In the last twenty years, the regulations governing septage treatment and disposal have changed significantly. Septage is a highly variable organic waste that can be fifty times stronger than normal strength wastewater. It is difficult to handle and treat, and is accompanied by an objectionable odor. Septage must now receive substantial treatment prior to disposal. According to the MA-DEP, even a small facility within the range of 5,000 gpd to 10,000 gpd would likely require a MA-DEP Groundwater Discharge Permit. A treatment facility within this flow range would typically consist of the following components: screening and degritting, flow equalization chambers, a biological treatment process (such as the RBC described in this chapter), a clarifier for sludge separation, effluent polishing for denitrification, and a SAS for effluent disposal to the groundwater. Depending on the location of the facility in Town, effluent disinfection may be required prior to disposal. For Westminster, the most cost-effective sludge disposal option for a small septage treatment facility would be to use a sludge hauling contractor since there are disposal locations near the Town. Generally, it is not cost-effective for small facilities to dewater the sludge prior to hauling. Land composting sludge is a difficult method of sludge disposal and regulatory requirements would likely make it cost prohibitive for Westminster. The cost of a septage treatment facility is usually high, and can vary widely due to the nature of the waste and the variable permit requirements. The probable construction cost of a septage treatment facility with a capacity between 5,000 gpd and 10,000 gpd is approximately $2 million dollars (2006 dollars). The operations and maintenance cost can vary, but a facility of this size will typically require at least one full-time operator. The probable operations and maintenance cost, including sludge disposal is approximately $65,000 annually. Therefore, the estimated 20-year planning period cost to the Town for this facility would be approximately $3.3 million dollars.

The potential revenue from an in-town facility can be estimated to determine if it is a cost effective option for the Town. S E A assumed that Westminster would not charge haulers more than $0.07 per gallon to dispose of septage, since other nearby facilities charge $0.05 to $0.07 per gallon. If the facility operates 300 days out of the year and receives an average of 5,000 gpd of septage over the planning period at a rate of $0.07 per gallon, then annual fees would total $105,000. After subtracting estimated operating

expenses, an in-town facility would generate approximately $40,000 in annual revenue. The initial capital cost of an in-town facility is very high. Assuming the Town obtained financing through the Massachusetts State Revolving Fund (SRF) to pay for the construction cost at the current interest rate of 2-percent (2006) and a term of 20-years, the estimated annual revenue generated by the facility would total approximately one third of the average annual payments required to pay off the loan.

It is recommended that the Town not construct a septage receiving facility in the near future, since the cost would be a burden to the Town. Currently, septic tank pump-out costs in Westminster do not appear to be more expensive than other parts of the state. A septage receiving facility is more cost-effective for communities with large in-town wastewater treatment plants or as a regional facility for use by more than one town. Since there are several nearby facilities that accept septage from Westminster, it is not certain if building an in-town facility would reduce pump-out costs for system owners, especially since the Town would have to charge haulers a high disposal fee to help generate adequate revenue at the facility. With the Templeton facility in operation again, the Westminster Board of Health should monitor septic tank pump-out costs for its residents over the next five years to determine if they become excessive. If in that time, improving septage management remains an important goal for the Town and pump-out costs are a burden to owners, then Westminster should evaluate potential sites and financing options to fund the construction of a septage treatment facility. Sites A-22, A-30, A-43, and A-49 are the most suitable sites because they have a central location within Town, favorable soil and groundwater conditions, and a greater separation from residential areas and sensitive resources.

7.10 Alternatives Screening Summary

As described in the screening methodology section (Section 7.4), the goal of the Wastewater Alternatives Analysis is to screen the overall approaches to wastewater management for each needs area to determine the ideal wastewater management method for Westminster's needs areas. For some needs areas, the alternatives analysis clearly determines a single, best approach. For other areas, the determinations are not as definitive. However, the goal of the process is to sort each needs area into one of three categories:

- **On-Site Wastewater Management**
- **Centralized/Regional Wastewater Management**
- **Possible Cluster Wastewater Management**

In general, areas that received On-Site Determinations contain conditions that can sufficiently support on-site systems through the twenty-year planning period with a low risk of health impacts or contamination to environmental and water resources. Some on-site systems in these areas may require upgrades to overcome site constraints that could include mounding the SAS and installing effluent pumps at the septic tank, or installing treatment units; however, the majority of the areas generally allow continued use of Title 5 management without onerous improvements and cost burden to owners.

The alternatives screening determined that a town-administered on-site wastewater management plan appears beneficial for the needs areas and other portions of Town that would continue to utilize Title 5 management and is worth further consideration by the Board of Health. An on-site wastewater management plan would ensure regular maintenance of on-site systems and would allow the Board of Health to gradually locate failing systems in Town. The plan may gain more support and be less costly to participants if the Town were to construct a local septage treatment facility, since regular septic tank pump-outs would be a component of the plan.

Needs areas that received Centralized/Regional Determinations contain conditions that significantly limit the use of conventional on-site systems thereby creating a higher risk of health impacts, contamination to environmental and water resources, or an excessive financial burden on owners. A centralized/regional

solution may include either a regional connection to the Fitchburg system, or the construction of a centralized facility within the Town, preferably located in the Flag Brook Sub-Basin of the Nashua River Watershed.

The Centralized/Regional category was divided into high priority and low priority classifications based on the relative need of each needs area receiving this determination. Areas with high priority determinations do not support the use of conventional on-site systems. On-site systems are either infeasible, a burden to owners, or a source of health risks or contamination to environmental or water resources. These areas require immediate attention to alleviate the current threats. Areas with low priority determinations exhibit some of the conditions found in needs areas with high priority determinations; however, the conditions are less severe, and on-site systems are not an immediate threat to public health and resources. On-site wastewater management is adequate for the short-term for most properties, but conditions are expected to worsen and the needs areas will require widespread attention within the twenty-year planning period.

There are not any needs areas with Potential Cluster Determinations, as this management approach received lower ratings than other available approaches for each needs area deemed to have a potential cluster option. The cluster approach is generally more difficult to implement and more costly on a per user basis than the other approaches. Most of the potential cluster treatment and disposal sites identified through the screening process are not located centrally within the needs areas. Therefore, wastewater from users in an area must be collected then transported to the site, similar to the centralized approach. However, since the approach consists of a smaller number of total users, there is not the same economy of scale as the centralized approach. Thus, the cost of the cluster approach is usually very high. Although, for proposed housing development, the approach may be practical. Housing subdivisions or complexes planned for a large parcel have the opportunity to consider a single, large treatment and disposal system within the site. Provided that there are favorable site conditions, the cost of this approach can be reduced through advantageous system layout and design. This management option should be a primary consideration for large proposed housing plans since municipal sewer capacity is limited and should be reserved for existing development with wastewater management needs. As recommended in Section 7.8, the Town should consider revising the Board of Health regulations to allow the cluster approach for certain types of development.

There are six needs areas located near potential cluster disposal sites. If Westminster chooses to pursue this alternative further, the actual feasibility of those potential sites must be determined through subsurface investigations. Once that has been completed, the assessment of the cluster approach against other management approaches must be revisited.

Wastewater management approach assessments and determinations for each needs area are identified in Table 7.10 and on Figure 7-12, attached at the end of this CWMP. The following subsections detail the analysis and conclusions for each of Westminster's needs areas.

Table 7.10
Wastewater Alternatives Analysis
Management Approach Assessments

Needs Area	Needs Area Name	Needs Assessment	Current On-Site Assessment	On-Site Wastewater Management Plan Assessment	Centralized/ Regional Assessment	Potential Cluster Assessment	Determination
3	State Road East Industrial	Mixed	Unfavorable	Unfavorable	Favorable	No Option	High Priority Centralized/ Regional
7	Bacon Street	Localized	Favorable	Favorable	Favorable	No Option	Low Priority Centralized/ Regional
10	Shady Avenue	Localized	Favorable	Favorable	Favorable	Neutral	On-Site
11	State Road West	Mixed	Favorable	Favorable	Favorable	No Option	On-Site
14	Bakers Grove	Mixed	Neutral	Neutral	Favorable	Unfavorable	Low Priority Centralized/ Regional
15	East Wyman	Mixed	Neutral	Neutral	Favorable	Neutral	Low Priority Centralized/ Regional
17	Eastern Westminster	Mixed	Unfavorable	Unfavorable	Favorable	No Option	High Priority Centralized/ Regional
19	Lake Drive West	Mixed	Neutral	Neutral	Favorable	No Option	On-Site
20	Lake Drive East	Mixed	Unfavorable	Unfavorable	Favorable	No Option	High Priority Centralized/ Regional
21	Edro Isle	Mixed	Unfavorable	Unfavorable	Favorable	Unfavorable	High Priority Centralized/ Regional
22	Lakewood Park	Mixed	Unfavorable	Unfavorable	Favorable	Neutral	High Priority Centralized/ Regional
23	Leino Park	Mixed	Unfavorable	Unfavorable	Favorable	Unfavorable	High Priority Centralized/ Regional

7.10.1 On-Site Wastewater Management Areas

7.10.1.1 Needs Area 10 – Shady Avenue

Although the needs analysis determined that the Holmes Park area is densely developed, the density is generally less than that of the areas surrounding Wyman Pond. Board of Health files indicate that there are not any tight tanks in use within the needs area and that Title 5 compliant system upgrades are feasible. The presence of Town water in the area helps to alleviate the constraints on installing systems also. A visual survey conducted in the area during the alternatives analysis located some mounded on-site systems. It is not anticipated that on-site wastewater management in the Holmes Park neighborhood causes significant impacts to environmental resources.

The alternatives analysis determined that implementing a regional approach for the needs area is feasible, but may cost approximately 50-percent more per user than the on-site approach. This is due to the need for a sewer extension to Gardner and the requirements for discharging to that City's facility. The centralized and cluster approaches would cost slightly more than the regional approach and were determined to be less favorable. Therefore, the assessment for the area is on-site wastewater management. This approach is expected to adequately serve the wastewater management needs of the area for the planning period. A town-administered on-site wastewater management plan should be considered for the area to enhance the effectiveness of the on-site approach.

7.10.1.2 Needs Area 11 – State Road West

The lots located nearest Tophet Swamp are the smallest within the needs area; however, they are larger than those surrounding Wyman Pond. Aside from shallow groundwater depths, Board of Health files did not indicate problems with upgrading on-site systems. The presence of Town water in the area helps to alleviate the constraints on installing systems also. A visual survey conducted in the area during the alternatives analysis did not reveal mounded on-site systems.

The alternatives analysis determined that implementing a regional approach for the needs area is feasible, but may cost approximately twice as much per user than the on-site approach. This is due to the need for a long sewer extension on State Road West to the existing sewer system. The centralized approach would cost more than the regional approach and was not determined to be favorable for the area. There is no option for the cluster approach. Therefore, the assessment for the area is on-site wastewater management. This approach is expected to adequately serve the wastewater management needs of the area for the planning period. A town-administered on-site wastewater management plan should be considered for the area to enhance the effectiveness of the on-site approach. I/A systems are a more expensive option for use in the needs area to overcome extreme circumstances, such as shallow groundwater.

7.10.1.3 Needs Area 19 – Lake Drive West

There are some small lots in the area, including a few very small lots. The majority of the lots appear to be of adequate size to facilitate Title 5 compliant upgrades. Board of Health files indicate that there are not any tight tanks in use within the needs area and that site conditions generally promote use of the on-site approach. The development density of this area is much less than that of the Lake Drive East area. As a whole, on-site wastewater management in this area should not have significant impacts to Partridge Pond provided that individual systems are maintained and operated properly.

The alternatives analysis determined that implementing a regional approach for the needs area is feasible, but may cost approximately 20-percent more per user than the on-site approach. The centralized approach would cost more than the regional approach and was determined to be less favorable for the area. There is no option for the cluster approach. The on-site approach received a neutral rating for the

area. The conditions in this needs area are not as problematic as the areas that received centralized/regional assessments, and the on-site approach appears to be adequately meeting wastewater management needs. Therefore, the assessment for the area is on-site wastewater management. This approach is expected to adequately serve the wastewater management needs of the area for the planning period. However, the very small lots referenced in this area will most likely not meet current Title 5 and will require tight tanks. These specific lots were observed during the visual survey and appeared to be small seasonal cottages that are used on a limited basis.

Needs Area 19 is a priority for consideration of a town-administered on-site wastewater management plan to maintain compliant on-site systems and protect Partridge Pond from malfunctioning systems. I/A systems are a more expensive option for use in the needs area to overcome extreme circumstances, such as small lots.

7.10.2 High Priority Centralized/Regional Wastewater Management Areas

7.10.2.1 Needs Area 3 – State Road East Industrial

Needs Area 3 is located adjacent to several sensitive resources including Whitman River, Crocker Pond, and Snows Millpond. Although site conditions are not restrictive in this industrial-zoned needs area, the cost to construct on-site systems to serve industrial establishments can be very high depending on the size and type of establishment. There is also concern regarding the nature and quality of wastewater effluent emanating from industrial users, and the potential for negative impacts to the environment. A centralized/regional wastewater management approach is typically preferred for existing or proposed industrial areas.

The alternatives analysis determined that the on-site approach is feasible, but the cost is uncertain for the area since industrial systems can vary widely in cost. This needs area is only partially developed and plans for future development are not definite at this time. Therefore, the per-user cost of the centralized/regional approach is not certain either. However, it is expected to be cost effective since the existing municipal sewer system is located adjacent to the needs area and sewers can be installed with other utilities as the area is developed. The cluster approach is not recommended for industrial areas. Although the on-site approach is technically feasible, the centralized/regional approach is more favorable and affords greater protection of surrounding resources. Consequently, it was given an assessment as a high priority centralized/regional area. Because the area is minimally developed, the developer should be encouraged to extend the existing municipal sewer system to new industrial development in this area.

7.10.2.2 Needs Area 17 – Eastern Westminster

This needs area contains portions of Sawmill Pond and Flag Brook in addition to other sensitive resources. Site conditions are restrictive in parts of this industrial-zoned needs area, and a visual survey conducted in the area during the alternatives analysis located many surface boulders. The cost to construct on-site systems to serve industrial establishments can be very high depending on the size and type of establishment. There is also concern regarding the nature and quality of wastewater effluent emanating from industrial users, and the potential for negative impacts to the environment. A centralized/regional wastewater management approach is typically preferred for existing or proposed industrial areas.

The alternatives analysis determined that the on-site approach is feasible, but the cost is uncertain for the area since industrial systems can vary widely in cost. This needs area is only partially developed and plans for future development are not definite at this time. Therefore, the per-user cost of the centralized/regional approach is not certain either. However, it is expected to be cost effective since the

existing municipal sewer system is located a short distance from the needs area and sewers can be installed with other utilities as the area is developed. The cluster approach is not recommended for industrial areas. Although the on-site approach is technically feasible, the centralized/regional approach is more favorable and affords greater protection of surrounding resources. Consequently, it was given an assessment as a high priority centralized/regional area. Because the area is minimally developed, the developer should be encouraged to extend the existing municipal sewer system to new industrial development in this area.

7.10.2.3 Needs Area 20 – Lake Drive East

Needs Area 20 consists of favorable soil conditions, but lot sizes are very small, which prevents Title 5 upgrades in certain circumstances. The area utilizes private wells for water supply also. Board of Health files identified two tight tanks in the needs area, and it is expected that more will be required in the future. The area was noted by local sources as one of the most challenging areas of Town to implement on-site wastewater management. The overall density of the needs area far exceeds the recommended Title 5 nitrogen loading guidelines; therefore, nutrient impacts to private wells and Partridge Pond are a concern.

The alternatives analysis determined that the on-site approach and a town-administered on-site wastewater management plan are unfavorable. The regional approach is favorable and costs approximately the same per user as the on-site approach. The regional approach for this area requires a moderate sewer extension from the golf course and an upgrade to the existing municipal pump station on Ellis Road. The centralized approach would cost more than the regional approach and there is no option for the cluster approach. The presence of very small lots and pond-front development warrants improved wastewater management. Consequently, the needs area was given an assessment as a high priority centralized/regional area.

7.10.2.4 Needs Area 21 – Edro Isle

Similar to Needs Area 20, this needs area consists of favorable soil conditions, but lot sizes are small and groundwater is very shallow, which make Title 5 upgrades very difficult. The area utilizes private wells for water supply also. Board of Health files identified one tight tank in the needs area, and more may be required in the future. System upgrades often necessitate variances from the Board of Health and may require system mounding. The area was noted by local sources as challenging to implement on-site wastewater management. The overall density of the needs area exceeds the recommended Title 5 nitrogen loading guidelines; therefore, nutrient impacts to Wyman Pond are a concern.

The alternatives analysis determined that the on-site approach and a town-administered on-site wastewater management plan are not favorable. The regional approach is favorable and costs slightly less per user than the on-site approach. The regional approach for this area requires connecting through an adjacent area that is also proposed for sewering (either Needs Area 23 or Needs Areas 14 and 15). The centralized approach would cost more than the regional approach. The cluster approach would bear even greater cost and was determined to be unfavorable. The presence of small lots and pond-front development warrants improved wastewater management. Consequently, the needs area was given an assessment as a high priority centralized/regional area.

7.10.2.5 Needs Area 22 – Lakewood Park

This needs area consists of favorable soil conditions, but lot sizes are very small and groundwater is likely shallow, which prevents Title 5 upgrades in certain circumstances. The area utilizes private wells for water supply also. Board of Health files identified four tight tanks in the needs area, and it is expected that more will be required in the future. The area was noted by local sources as one of the most challenging areas of Town to implement on-site wastewater management. The overall density of the

needs area far exceeds the recommended Title 5 nitrogen loading guidelines; therefore, nutrient impacts to private wells and Wyman Pond are a concern.

The alternatives analysis determined that the on-site approach and a town-administered on-site wastewater management plan are unfavorable. The regional approach is favorable and costs slightly less per user than the on-site approach. The regional approach for this area requires connecting to the existing municipal sewer system through Needs Area 15. The centralized approach would cost more than the regional approach. The cluster approach would bear even greater cost and received a neutral scoring. The presence of very small lots and pond-front development warrants improved wastewater management. Consequently, the needs area was given an assessment as a high priority centralized/regional area.

7.10.2.6 Needs Area 23 – Leino Park

Needs Area 23 consists of favorable soil conditions, but lot sizes are very small and groundwater is shallow, which prevents Title 5 upgrades in certain circumstances. Board of Health files identified eight tight tanks in the needs area, and it is expected that more will be required in the future. The needs area was noted by local sources as the most challenging area of Town to implement on-site wastewater management. The overall density of the needs area far exceeds the recommended Title 5 nitrogen loading guidelines; therefore, nutrient impacts to Wyman Pond are a concern.

The alternatives analysis determined that the on-site approach and a town-administered on-site wastewater management plan are unfavorable. The regional approach is favorable and costs slightly less per user than the on-site approach. The regional approach for this area requires connecting to the existing municipal sewer system through Leino Park Road. The centralized approach would cost more than the regional approach. The cluster approach would bear even greater cost and was determined to be unfavorable. The presence of very small lots and pond-front development warrants improved wastewater management. Consequently, the needs area was given an assessment as a high priority centralized/regional area.

7.10.3 Low Priority Centralized/Regional Wastewater Management Areas

7.10.3.1 Needs Area 7 – Bacon Street

This needs area has variable site conditions. Some portions of the area appear to be more limiting than others with respect to soil conditions and depth to groundwater. Lot sizes are generally small in this needs area, but they are larger than those surrounding Wyman Pond. The area was noted by local sources as posing limitations to upgrading on-site systems. The Town DPW facility is located at the northern extent of the needs area and the use of on-site wastewater management for the facility poses a threat to nearby resources. Recent stormwater sampling performed for the CWMP identified potential water quality impacts from the facility as noted in Chapter 6 of this report.

The alternatives analysis determined that the on-site approach is feasible for this needs area; however, site conditions at the DPW facility are extremely limiting and do not support Title 5. The regional approach is more favorable; however, it may cost approximately twice as much per user as it appears that two sewer pump stations are necessary to serve the area. The centralized approach would cost more than the regional approach and there is no option for the cluster approach. The on-site wastewater management approach appears adequate as an interim approach, but site constraints may necessitate a more favorable approach within the planning period. Also, the needs area warrants selection for improved wastewater management to prevent potential impacts from the DPW facility. Consequently, the needs area was given an assessment as a low priority centralized/regional area.

The DPW should consider certain practices to sustain proper function of the on-site system at the DPW facility until an improved wastewater management approach can be implemented. Applicable Best Management Practices described in Chapter 6, regular maintenance and pumping, and water conservation measures described in Chapter 5 will help alleviate burden on that system.

7.10.3.2 Needs Area 14 – Bakers Grove

Needs Area 14 consists of favorable soil conditions, but the depth to groundwater and small lot sizes make installing and upgrading on-site systems difficult. Lot sizes are not quite as small as the Leino Park and Lakewood Park areas, and Board of Health files did not identify tight tanks in the needs area. However, the area was noted by local sources as posing limitations to upgrading on-site systems and its proximity and to Wyman Pond is a concern.

The alternatives analysis determined that the on-site approach is marginal for use in this needs area. The regional approach is more favorable; however, it may cost approximately 70-percent more per user. The high cost of the regional approach is partially due to the long extent of low-pressure sewer needed to serve Linda Drive and Laurelwood Drive. If these areas are eliminated, the approach is more cost effective. The centralized approach would cost more than the regional approach. The cluster approach would bear even greater cost and was determined to be unfavorable. The presence of small lots and pond-front development warrants improved wastewater management in this area in order to protect Wyman Pond. Consequently, the needs area was given an assessment as a low priority centralized/regional area. A portion of the pond-front development in this needs area consists of campground cabins subject to seasonal use; therefore, the on-site wastewater management approach appears adequate as an interim approach until an improved wastewater management method can be implemented.

Needs Area 14 is also a priority for consideration of a town-administered on-site wastewater management plan to ensure seasonal systems at the campgrounds are not malfunctioning and impacting Wyman Pond until the centralized/regional solution is implemented.

7.10.3.3 Needs Area 15 – East Wyman

Similar to Needs Area 14, this needs area consists of favorable soil conditions, but small lot sizes make installing and upgrading on-site systems difficult. Lot sizes are not quite as small as the Leino Park and Lakewood Park areas, and Board of Health files did not identify tight tanks in the needs area. However, the area was noted by local sources as posing limitations to upgrading on-site systems and its proximity to Wyman Pond is a concern.

The alternatives analysis determined that the on-site approach is marginal for use in this needs area. The regional approach is more favorable; however, it may cost approximately 50-percent more per user. The high cost of the regional approach for the needs area is partially due to the sewer extensions necessary to serve a small amount of unsewered properties located west of East Road. If these areas are eliminated, the approach is more cost effective. The centralized approach would cost more than the regional approach. The cluster approach would bear even greater cost and received a neutral rating. Overall, the area is within close proximity to Wyman Pond and impacts from on-site systems are a concern. This needs area warrants improved wastewater management for resource protection. Consequently, it was given an assessment as a low priority centralized/regional area. Some of the pond-front development in this needs area consists of lots with moderate size, except for those located on South Shore Road. Therefore, the on-site wastewater management approach appears adequate as an interim approach until an improved wastewater management method can be implemented.

Needs Area 15 is also a priority for consideration of a town-administered on-site wastewater management plan to ensure on-site systems are not malfunctioning and impacting Wyman Pond until the centralized/regional solution is implemented.

7.10.4 Alternatives Analysis Conclusions

The Wastewater Needs Analysis evaluated the conditions in 25 study areas in the Town of Westminster and determined that the current Title 5 on-site wastewater management approach adequately met the Town's goals in 13 study areas. However, for the remaining 12 needs areas, alternative wastewater management approaches could provide better protection of public health, environmental resources, and drinking water supplies, or could provide property owners a more cost-effective wastewater management solution. The purpose of the Wastewater Alternatives Analysis is to match each needs area with the most advantageous wastewater management strategy while meeting the goals of the CWMP.

The alternatives analysis considered several wastewater management approaches. Possible localized solutions evaluated in the analysis include continued use of conventional on-site systems under Title 5, adoption of additional local Board of Health regulations that would require more aggressive management of on-site systems, and cluster solutions that would serve a limited number of users with a small wastewater treatment and disposal facility located at a nearby site. Other approaches evaluated in the analysis include centralized, in-town treatment and disposal facilities intended to receive significant wastewater volumes from large portions of Westminster, and regional systems connecting to the Fitchburg or Gardner municipal sewer systems.

Prior to evaluating alternative approaches for each of the Town's 12 needs areas, S E A screened possible locations for centralized and cluster treatment and disposal facilities. The investigations and analyses determined that three sites, A-30, A-43, and A-49, have potential to support a centralized facility. Access to Site A-30 could not be obtained; therefore, subsurface investigations were not conducted at the site. Sites A-43 and A-49 are privately-owned and access was not obtained for conducting subsurface investigations. Based on the information gathered and knowledge of subsurface conditions in Town, Sites A-43 and A-49 are more likely to support a large facility. The investigations and analyses determined that five sites, A-33, A-40, A-43, A-46, and A-49, have potential to support a cluster system. Sufficient subsurface data was previously gathered for Site A-33 during past municipal drinking water well investigations. The remaining sites are privately-owned and access was not obtained for conducting subsurface investigations. Based on the information gathered and knowledge of subsurface conditions in Town, Sites A-33, A-43, and A-49 are more likely to support a cluster system. S E A determined that all other investigated locations contain numerous features or limitations that would likely render those sites infeasible for treatment and disposal facilities. Only these sites have favorable site conditions that warrant subsurface investigation to determine their potential disposal capacity.

Data collected during the existing conditions and needs analysis phases of the CWMP was supplemented with some additional data to evaluate each of the different wastewater management approaches for each needs area. Since the goal of the evaluation process was to be detailed yet objective, S E A selected screening criteria that assess engineering considerations such as technical feasibility and cost, environmental considerations such as environmental impacts/benefits and contamination risk, municipal considerations such as legal liability and political reality, and population considerations such as odor impacts and visual aesthetics. The conclusions detailed below derive from the screening criteria evaluation, consideration of overall impacts not necessarily reflected in the criteria, feedback from the Citizens Advisory Committee and Technical Advisory Group for the CWMP, and input gained from a public alternatives workshop.

S E A concluded that continued on-site wastewater management is the preferred approach for three (3) needs areas. The alternatives analysis determined that public health risks and impacts to sensitive resources were minimal, and that the on-site approach presented the most cost-effective wastewater management approach to property owners through the twenty-year planning period. When the planning period expires, this analysis should be revisited to determine if systems have degraded on a widespread basis or if cumulative effects have altered to create greater public health and/or environmental contamination risks.

S E A also evaluated the option of augmenting the existing Title 5 regulations with additional local regulations to be enforced by the Board of Health that would require regular septic tank pumping and allow for system function checks. This option appeared beneficial for areas of Town that face greater limitations to on-site management. However, the benefits of reducing contamination impacts and risks by regulating system pumping and check-ups may be outweighed by the additional costs and political difficulties associated with enacting and enforcing the additional regulations. Therefore, a town-administered on-site wastewater management plan should be carefully evaluated by Westminster.

Needs Areas for which On-Site Management is the Preferred Approach

Area No.	Needs Area
10	Shady Avenue
11	State Road West
19	Lake Drive West

S E A concluded that a centralized/regional wastewater management approach is a high priority for six (6) needs areas. The alternatives analysis determined that for many of these areas, continued use of on-site systems administered under the current Title 5 regulations poses a threat to environmental resources, and in some instances, impacts to those resources are manifesting. The alternatives analysis also determined that conditions increase localized public health risks and increase replacement system costs. Moreover, Title 5 upgrades are not possible in some of these areas and tight tanks have been required. The relative severity of the problems in these needs areas prompted them to be designated as a high priority for alternatives to the current Title 5 systems, and the centralized/regional approach was determined to be the most favorable and cost effective alternative available.

Needs Areas for which Centralized/Regional Management is a High Priority

Area No.	Needs Area
3	State Road East Industrial
17	Eastern Westminster
20	Lake Drive East
21	Edro Isle
22	Lakewood Park
23	Leino Park

S E A concluded that a centralized/regional wastewater management approach is a low priority for three (3) needs areas. The low priority areas and the high priority areas share many characteristics. Conventional on-site systems are not anticipated to meet the Town's long-term goals; however, on-site wastewater management does not pose the same degree of difficulty and concern in these areas. In general, continued used of on-site systems in these areas is not likely to pose an immediate threat to environmental resources or cause imminent public health risks. Similarly, on an area-wide basis, replacing on-site systems is not expected to place an excessive financial burden on property owners. Exceptions to these area-wide conclusions do exist, and overall conditions in these areas are expected to

deteriorate over the course of the planning period. The centralized/regional approach was determined to be the most favorable and cost effective alternative available; therefore, these needs areas should be included as low-priority areas. Since their priority is less, the centralized/regional approach could be initially extended to targeted portions of these areas in order to improve wastewater management where conditions are more severe.

Needs Areas for which Centralized/Regional Management is a Low Priority

Area No.	Needs Area
7	Bacon Street
14	Bakers Grove
15	East Wyman

The centralized/regional determinations are based primarily on the physical conditions and the performance of on-site systems in needs areas. The determinations disregard the fundamental nature of the centralized treatment and disposal facility. Either the regional Fitchburg facility or a new, in-town centralized facility could accommodate those wastewater management needs. The primary advantage of the centralized approach is the potential groundwater recharge benefits to the Nashua River Watershed. The primary disadvantage of the centralized approach is capital cost. Depending on many variables such as treatment capacity, effluent limits, land acquisition, and site conditions, the cost for a centralized treatment and disposal facility could range from $5,000,000 to $10,000,000. Depending on the number of properties served, this translates to a cost range of $4,000 to $5,000 per property served. For smaller facilities, the cost per user can approach $6,000. Operational costs for the centralized facility would likely be comparable to the fees paid to Fitchburg per user.

The Town of Westminster sewer system currently discharges to the Fitchburg sewer system for treatment and disposal at the East Fitchburg treatment facility. The amount of wastewater that Westminster currently discharges to Fitchburg has not yet reached the limits stipulated in the most recent intermunicipal agreement between the two communities. Moreover, the 1998 amendment to the intermunicipal agreement allows for additional wastewater capacity to Westminster through improvements made to the Fitchburg sewer system. Although there are significant Westminster sewer infrastructure needs if the Town were to convey additional wastewater to Fitchburg for treatment and disposal, the Town must address many of these needs soon, even if new connections were diverted to an in-town centralized facility.

The *Hydrologic Assessment of the Nashua River Watershed* indicates that the Nashua River is stressed and the Flag Brook Sub-Basin in particular would benefit greatly from groundwater recharge to offset the current imbalance of water imports and exports. The significant imbalance in the Flag Brook Sub-Basin is primarily due to large surface water withdrawals from Meetinghouse Pond for the Regional Water Filtration Facility located in Westminster. Both Westminster and Fitchburg currently benefit from the water treatment facility, with the potential for other nearby communities to obtain drinking water from the facility in the future. In addition, all communities that are located within the watershed share an equal responsibility for improving the watershed groundwater recharge conditions. Although the centralized approach is intended to meet Westminster's wastewater management needs, the approach benefits the entire watershed. The Flag Brook Sub-Basin of the Nashua River Watershed would clearly gain crucial groundwater recharge from a centralized wastewater facility in Westminster; however, the Town has access to a much less costly option in the Fitchburg sewer system, which discharges one sub-basin downstream from Flag Brook.

Considerable funding for a centralized wastewater treatment and disposal facility must originate from sources other than Westminster's taxpayers and sewer users if the centralized approach is to be

considered a viable alternative to the Fitchburg sewer connection. Consequently, the centralized wastewater management approach will not be considered in the recommended plan chapter of this report that follows the alternatives analysis. As watershed management plans are developed by other watershed communities, the Nashua River Watershed Association, and state agencies, consideration should be given to funding a centralized wastewater facility in Westminster to meet the overall goals of the Nashua River Watershed.

8. Recommended Plan

8.1 Introduction

Previous chapters of the CWMP have documented the existing environmental, wastewater management, water supply, and stormwater management conditions in the Town of Westminster. The existing conditions chapters inventoried the Town's infrastructure and management systems and the needs analysis chapters assessed the adequacy of those systems to meet the Town's goals. Impacts to the environment were also identified in the needs analysis chapters. The wastewater alternatives analysis assessed and prioritized available options that could potentially meet the Town's wastewater management goals and reduce environmental impacts. Each of the recommendations of the different CWMP chapters has its own set of costs, impacts, and benefits. The goal of the Recommended Plan is to document the water supply and stormwater management recommendations and to create a cost-effective integrated approach to wastewater management that meets the most goals of the Town, produces the highest environmental benefit, and creates the least environmental impact.

The goals and objectives of the CWMP are stated throughout the various chapters of this report. Therefore, they were collected and compiled to establish comprehensive goals for the entire CWMP. These goals are listed below.

- To provide improved wastewater management for areas of Town where current management methods are a threat to both the environment and public health and present a financial burden to owners.

- To develop a plan that will strive to manage wastewater in a manner that facilitates the desired land uses and development characteristics described in the Westminster Master Plan.

- To protect the environmental resources and public health to the maximum extent possible both in Westminster and within the broader regions surrounding the Town.

- To diminish impacts to the Nashua River Basin through management methods that provide recharge to local basins and minimize water withdrawals or exports.

- To protect public water supplies and provide safe, reliable water to the residents and businesses of Westminster.

- To minimize costs to wastewater system users and taxpayers.

- To produce a plan that will gain both regulatory approval and funding support from Town Meeting so that the recommendations can be implemented.

8.2 Summary of Recommendations

Although a typical CWMP primarily studies wastewater management aspects for a particular community or management district, the scope of this report also includes an evaluation of water supply and stormwater management in Westminster. Consequently, various needs and recommendations not relating to wastewater management were identified through these evaluations and were summarized in relevant chapters of the CWMP. However, the scope of this report does not include an extensive evaluation of solutions or detailed implementation plans for aspects other than wastewater management. Therefore,

S E A has compiled a summary of all recommendations for the Town with references to the applicable chapter and section number for convenience.

8.2.1 Water Supply

The following recommendations relate to water supply in the Town of Westminster and are provided in the associated chapters of this report.

- Evaluation of Current Water Supply

  The Town should monitor maximum daily demand and other extended periods of high demand each year to determine if it will soon exceed the permitted daily water supply threshold with Fitchburg (0.87 mgd over 7 consecutive days) and the water system capacity at the Hager Park Pump Station (1.0 mgd) (Chapter 5 - Section 5.9).

- Emergency Water Supply

  The emergency pump station at South Street appears capable of delivering emergency supply under average water demand conditions based on the projections; however, it cannot meet current maximum daily demands (Chapter 5 – Section 5.8). The Town should develop a plan for meeting maximum demand under prolonged emergency periods and ensure that existing water system interconnections are capable of providing emergency supply from other communities.

- Potential Public Water Supply Well

  The Town's potential well site, referred to as Site 20 and located in the vicinity of Honey Bee Lane, is a favorable well site based on previous analyses. Installing this well would require significant infrastructure in addition to a pump station and treatment system (Chapter 3 – Section 3.2.4). The well site lies within the Flag Brook Sub-Basin, which is highly stressed and may make permitting difficult. Generally, the permitting process for a new groundwater source would take approximately five to seven years in its entirety to gain approval. The Town also has the option of increasing the amount of water supply currently obtained from the Fitchburg water treatment plant. Therefore, S E A recommends that the Town evaluate both alternatives for increasing water supply in the future. The evaluation should include the costs, schedule, benefits, and impacts of both alternatives (Chapter 5 – Section 5.9.2).

- Water Demand Management

  While average daily demands have fluctuated within a small range since 2001, maximum daily demand has steadily increased. Maximum daily demand typically occurs during an extended period of elevated water consumption and is usually attributed to seasonal water use during the summer. A major component is outdoor use (Chapter 5 – Section 5.8). The Town should review its practices for restricting seasonal outdoor water use and enhance current programs to prevent maximum demand from exceeding current water supply. The Town should also review its current drought management program.

- Water Conservation

  1. The Town should continue to enhance its water conservation programs in order to preserve the Town's supply and reduce impacts to stressed basins in the Nashua River Watershed. Specific areas or programs suggested include: public education, leak detection, metering/maintenance,

rates/pricing, residential water use strategies, public sector water use strategies, industrial and commercial water use strategies, and water supply management (Chapter 5 - Section 5.9.1).

2. S E A recommends that future water conservation programs should include all residences in Town, as those with private wells are just as likely to increase water use during the warmer months as residences connected to the municipal water system (Chapter 5 - Section 5.9.2). Private wells within stressed river basins have the same cumulative impact as a municipal supply that is distributed to many customers.

- Water System Expansion

  Current zoning designations for undeveloped areas appear to be suitable for future use and protection of private well supplies. There are areas of Town with high development density that utilize private wells, including neighborhoods around Partridge Pond and Wyman Pond. Extending the municipal water system to these areas should be considered in the future as need precipitates (Chapter 5 - Section 5.9.3).

8.2.2 Stormwater Management

The following recommendations relate to stormwater management in the Town of Westminster and are provided in the associated chapters of this report.

- Surface Water Protection

  Greenwood Pond, Minott Pond South, Minott Pond and Wrights Reservoir, were placed on the Department of Environmental Protection (MA-DEP) - 1998 303(d) list of impaired waterways due to the observation of very dense algae and aquatic plants. A TMDL Study for phosphorus was completed by the DEP, and found that Minott Pond was the only lake which had a developed phosphorus target lower than the current loading. The remaining three lakes were found to have levels that were naturally occurring. Still, it was determined that management of phosphorus should be targeted by public education, watershed surveys, the development of lake management plans and additional lake specific BMPs (Chapter 1 - Section 1.3.5). This topic should be included in public education and materials distributed by the Town as detailed in the *Preferred Stormwater Management Approaches* recommendation.

- Preferred Stormwater Management Approaches

  Non-structural approaches are a relatively simple method of improving town-wide stormwater conditions. These approaches include public education, employee training, pet waste collection, landscape management, and street sweeping programs. S E A acknowledges that citizen involvement is crucial for successful stormwater management, and is a requirement of the NPDES Phase II program (Chapter 6 - Section 6.7.2). These approaches are recommended for the Town as detailed in Chapter 6.

- Preferred Stormwater Management Systems

  Prior experience working with Massachusetts communities on stormwater related projects has revealed systems that are used repeatedly because they are the most beneficial and cost effective. These systems should be given priority for implementation and should be considered in new development and redevelopment applications (Chapter 6 - Section 6.7.2). The preferred systems include dry wells for uncontaminated roof runoff; reversed elevation systems for new or redeveloped

parking areas; deep sump catch basins with hoods; and centralized stormwater treatment and infiltration systems for large residential development, large commercial development, and industrial development. These systems are recommended for use in the Town as detailed in Chapter 6.

- Enhanced Stormwater Regulations

1. To regulate stormwater in development that does not fall under the jurisdiction of the Planning Board, the zoning regulations should be amended to require a Stormwater Management Permit for all new development and redevelopment within Westminster with a goal to mitigate stormwater impacts pertaining to runoff, infiltration, and water quality. The expected level of compliance varies by the type of proposed development and the judgment of the reviewing authority. The Permit should require the use of post-construction runoff controls, which include the use of structural BMPs and standards for long-term maintenance. Current review procedures should be enhanced to include coordination between applicable Town departments and should include regular inspection of on-going construction activities in the Town (Chapter 6 – Section 6.7.3).

2. The Flood Plain District established by the zoning regulations should be modified to prohibit stockpiling and disposal of snow and ice containing sand and deicing chemicals (Chapter 6 – Section 6.7.3).

3. The site plan review process should include an evaluation of proposed structural BMPs from an operations and maintenance perspective by the DPW or its designee (Chapter 6 – Section 6.7.3).

4. The Westminster Stormwater Committee is currently preparing a regulation to prohibit non-stormwater discharges to the Town storm drain systems. The regulation should include appropriate enforcement procedures (Chapter 6 – Section 6.7.3).

5. Regulations should address dewatering operations occurring on-site or off-site as a result of construction (Chapter 6 – Section 6.7.3).

6. There are a number of other stormwater management controls that are required by the NPDES Phase II plan that must be eventually addressed by the Town. These controls are summarized as follows (Chapter 6 – Section 6.7.3):

    - Regulations should include a procedure for receipt and consideration of information submitted by the public regarding local construction activities.

    - The DPW should develop and implement a program for monitoring the performance and condition of BMPs post-construction.

    - The DPW should work with the appropriate Town departments to establish a funding mechanism to support operation and maintenance of structural BMPs.

8.2.3 Wastewater Management

The following recommendations relate to wastewater management in the Town of Westminster and are provided in the associated chapters of this report.

- Sewer Collection System

    1. It is suspected that the capacity of the 8-inch flume upstream of the Whitman River Pump Station is too small to accurately measure peak flows discharging to the station (Chapter 2 - Section 2.3.2.1). The flume should be upgraded when improvements are made to the Whitman River Pump Station.

    2. There is an observed odor and corrosion problem occurring in the vicinity of the gravity sewer manhole on East Road at Laurel Drive. The problem is related to the configuration of the sewer system tributary to this manhole. It is likely caused by the operation patterns of Wachusett Ski Area, which is generally idle in the summer when the wastewater reaches its highest temperatures and the discharges from their pump station are minimal on a daily basis. These conditions contribute to increased sulfide generation in the summer. The force main configuration and low pressure sewer downstream from Wachusett may exacerbate the problem (Chapter 2 - Section 2.5.3). Westminster should not allow additional pressure systems (force main and low pressure sewer) in this area of the sewer system. As part of the long term planning for the municipal sewer system, the Town should evaluate potential options such as chemical addition for odor control or even reconfiguring this area of the system, such as installing gravity sewer so that all discharges flow south on East Road to Mile Hill Road with a single pump station that pumps north to the existing gravity sewer manhole on East Road at Laurel Drive.

    3. The Town sewer system is currently at capacity and exhibits a need for increased capacity to serve existing sewered areas and future areas that are connecting to the system (Chapter 4 - Section 4.6.1). Wastewater flow from recommended sewer expansion areas, estimated in Section 8.3 of this chapter, will add to that need. The recommended plan to increase capacity of the sewer collection system as detailed in Section 8.4 of this chapter should be implemented immediately.

- Infiltration and Inflow (I/I)

    1. Earth Tech, Inc. has been performing on-going I/I investigations for the DPW that included a television inspection program and a smoke testing program. The associated report recommends minor rehabilitation work, but no significant I/I sources were located. The inspections did not yield a significant number of I/I sources; however, the DPW Director suspects the sewer system has substantial inflow sources (Chapter 2 - Section 2.3.2.3).

    2. Earth Tech will be providing a final report to the Town with potential recommendations for reducing I/I in the near future. The current capacity limitations in the sewer system and the stress situation in the Nashua River Basin make reducing I/I a critical goal for the Town (Chapter 4 – Section 4.6.1). The recommendations of the final report should be addressed and large I/I sources should be targeted and corrected immediately. If the report does not identify significant sources, the Town should conduct additional investigation particularly for inflow sources.

- Sewer System Regulations

    The Westminster Subdivision of Land regulations identify that new connections to existing sewers shall be made if there is adequate capacity to serve the subdivision. If there is inadequate capacity to serve the entire subdivision, only a portion that can be accommodated shall be allowed to connect (Chapter 2 - Section 2.4.2). These regulations should be revised to prohibit connecting to municipal sewers unless the development is located within the approved sewer district as recommended in Section 8.7 of this chapter.

- Board of Health Operations and Regulations

1. A significant component of the Board of Health regulations is the requirement that a Title 5 system must be located on the same lot as the building that it serves. This regulation prevents the use of nearby lots and/or easements to construct a "satellite" system to serve a building or several buildings on separate parcels of land (Chapter 2 - Section 2.6.2.1). The satellite, or cluster approach could be allowed in Westminster as a wastewater management solution for proposed housing complexes instead of sewer to prevent further stress to the municipal sewer system. Ownership and operation would be the responsibility of the private entity and would not place additional burden on the Town. The Board of Health should evaluate potential modifications to the regulations to allow cluster systems where necessary to protect the municipal sewer system and facilitate development goals presented in the Westminster Draft Master Plan (Chapter 7 - Section 7.8).

2. According to Title 5, systems that require pumping more than four times per year are considered failing. As the Board of Health receives pump-out tickets from septage haulers, they place them into the appropriate files and review prior pump-out tickets to confirm if that particular system is a conventional system exceeding four pump-outs per year (Chapter 2 - Section 2.6.2.2). The Board of Health has been developing a database that contains important subsurface disposal system and private well information for each owner in Town. This database should be expanded to include annual septic tank pump-out history to allow better tracking of pumping and failing systems.

3. The Westminster Board of Health should monitor septic pump-out costs for its residents over the next five years (2006-2011) to determine if they become excessive. If in that time, improving septage management remains an important goal for the Town and pump-out costs are a burden to owners, then Westminster should evaluate potential sites and financing options to fund the construction of a septage treatment facility (Chapter 7 - Section 7.9.1).

4. A town-administered on-site wastewater management plan appears beneficial for portions of Town that would continue to utilize Title 5 management and is worth further consideration by the Board of Health. An on-site wastewater management plan would ensure regular maintenance of on-site systems and would allow the Board of Health to gradually locate failing systems in Town (Chapter 7 - Section 7.10). The Board of Health should consider implementing an on-site wastewater management plan over the next five years (2007-2011). During this evaluation period, the Board of Health should implement a voluntary plan to evaluate owners' interest in maintaining their subsurface disposal systems. The plan would require a database that tracks septic tank pumping in Town and identifies systems that are overdue for pumping. The recommended pumping schedule could be every three or four years, as determined by the Board. The Board would provide notice to owners when their system should be pumped. Any plan that is implemented by the Board of Health should focus on the needs areas proposed for sewer expansion identified in the following subsection of this chapter until such time that municipal sewer can be extended to those areas. Guidance for an on-site wastewater management plan is provided on the MA-DEP web site at the following link: http://www.mass.gov/dep/water/wastewater/csmphl.htm. The "Local Septic Management Plan" described at this location is most similar to the recommendations of the CWMP.

- Water Reuse

  Water reuse applications in Westminster are worth consideration since they would provide a benefit to the stressed Nashua River Basin. Golf courses and certain industries have effectively implemented water reuse applications, both of which are present in Westminster (Chapter 7 - Section 7.2.1.3.2). The Town should encourage alternative water conservation and reuse methods for large water users and provide education materials with water bills.

8.2.3.1 Recommended On-Site Wastewater Management Areas

The wastewater needs analysis (Chapter 4) identifies areas of Westminster where Title 5 management meets the Town's goals, and no further analysis is required. These conclusions are based on extensive analysis as detailed in the needs analysis chapter. The analysis indicates that these areas generally contain large parcels that support Title 5 management and that future parcels will have adequate land area for systems, as dictated by Westminster zoning. Also, continued use of Title 5 management is not anticipated to have negative impacts to nearby resources or public health.

On-Site Wastewater Management Areas

There are a total of thirteen (13) study areas that were determined to be suitable for on-site wastewater disposal under Title 5 management. These areas are listed in Table 4.1 of Chapter 4.

During previous phases of the CWMP, these areas were represented as geographical regions. As part of the recommended plan phase of the CWMP, S E A used the Town's assessors database to identify the parcels that comprise these areas. The parcels were checked to make sure they did not already have sewer connections using the Town sewer user database. There may be instances in which particular houses or parcels listed below currently have access to municipal sewer, in which case they represent the existing sewer areas.

The parcels that comprise the On-Site Wastewater Management Areas are summarized in the following table:

• Amber Road	• North Common Road (Hse. Nos. 33, 73-189; Parcel Nos. 62-21, 79-18)
• Andrea Lane	• North Common Road-Rear (Parcel No. 70-2)
• Ashburnham State Road	• North Gardner Road
• Ashburnham State Road-Rear (Parcel No. 28-20)	• Norwood Street (Hse. No. 14)
• Barrel Road	• Notown Road
• Bartherick Road (Hse. Nos. 6-22, 26-170; Parcel Nos. 76-7, 76-11, 76-12.1, 76-12.2, 90-12, 91-10, 98-32)	• Noyes Pond (Parcel No. 195-12)
• Bartherick Road-Rear (Parcel No. 76-11)	• Oakmont Avenue (Hse. Nos. 3-94; Parcel Nos. 53-51, 53-52, 53-63, 53-64, 62-12, 70-15)
• Battles Road (Hse. Nos. 8-43, 46-48; Parcel No. 111-10)	• Oakmont Avenue-Rear (Parcel No. 70-1)

• Bean Porridge Hill Road (Hse. Nos. 2-282; Parcel Nos. 16-5, 16-11, 30-1, 30-3, 30-4, 41-12, 41-12.1, 41-13, 41-14, 44-16, 44-18, 44-20, 56-1)	• Oakmont Drive
• Bean Porridge Hill Road-Rear (Parcel Nos. 27-1, 57-1, 57-2, 59-34)	• Oakmont Center
• Beech Hill Road	• Old Ashburnham Turnpike
• Blueberry Hill Lane	• Old Country Road
• Bolton Road	• Old Country Road-Rear (Parcel Nos. 107-14, 107-15)
• Bourgeois Terrance	• Old East Gardner Road
• Bragg Hill Road	• Old Gardner Road
• Carter Road (Hse. Nos. 45-76; Parcel No. 124-46)	• Old Town Farm Road
• Carter Road-Rear (Parcel No. 124-12)	• Old Worcester Road (Hse. Nos. 6, 8; Parcel Nos. 122-15, 122-16)
• Colony Road	• Overlook Road (Hse. Nos. 23-142; Parcel Nos. 63-3, 63-5, 69-4, 69-5, 69-13, 80-1.12, 80-1.13, 80-1.31, 80-1.4)
• Cross Road	• Overlook Road-Rear (Parcel No. 69-14)
• Curtis Road	• Park Street (Hse. No. 12)
• Davis Road	• Partridge Hill Road
• Davis Road-Rear (Parcel No. 183-15)	• Pierce Road
• Dawley Road (Hse. Nos. 24, 28; Parcel No. 123-8)	• Potato Hill Road
• Dawley Road-Rear (Parcel No. 123-19)	• Potato Hill Road-Rear (Parcel Nos. 42-12, 43-1)
• Dean Hill Road	• Raymond Road
• Dean Hill Road-Rear (Parcel Nos. 4-15,13-4)	• Ridge Street (Parcel No. 104-3)
• Depot Road (Hse. Nos. 4-20; Parcel Nos. 95-2, 95-11, 95-13, 95-14)	• Ridge Street-Rear (Parcel No. 104-63)
• East Gardner Road	• Roper Road (Hse. Nos. 16-35; Parcel No. 74-5)
• East Main Street (Parcel Nos. 111-2, 111-2.1)	• Round Meadow Pond and Dam (Parcel No. 98-50)
• East Road (Hse. Nos. 138, 156-204; Parcel Nos. 171-18, 187-1)	• Route 2 East (Parcel Nos. 113-21, 113-22, 114-4)
• East Road-Rear (Parcel No. 139-13)	• Route 2 West-Rear (Parcel No. 83-13)
• Ellis Road (Hse. Nos. 117, 121, 125, 131, 133-244; Parcel Nos. 106-2, 107-25, 126-3, 126-102, 127-23, 127-25, 128-6, 128-24, 132-3)	• Sargent Road
• Ellis Road-Rear (Parcel Nos. 107-12, 125-17, 132-1, 132-2)	• Shady Avenue
• Fitchburg Road (Parcel No. 116-1)	• Shady Avenue-Rear (Parcel No. 83-15, 86-22)

• Fitchburg Road-Rear (Parcel No. 115-1)	• Simplex Drive (Hse. No. 400; Parcel No. 81-10)
• Fred Smith Road	• South Ashburnham Road
• Fred Smith Road-Rear (Parcel No. 15-7)	• South Ashburnham Road-Rear (Parcel No. 31-1)
• Frog Hollow Road (Hse. No. 35; Parcel No. 135-8)	• South Street (Hse. Nos. 50-175; Parcel Nos. 124-8, 135-9, 135-13.1, 150-5, 150-7, 150-13, 159-1, 159-7, 176-2, 181-1)
• Gatehouse Road (Hse. No. 5)	• Spring Street (Hse. No. 3)
• Goodrich Drive	• Spruce Road
• Hager Park Road	• State Road East (Hse. Nos. 32, 36, 216; Parcel Nos. 76-24, 98-41)
• Hager Park Road-Rear (Parcel No. 137-5)	• State Road East-Rear (Parcel No. 94-1)
• Hanks Hill Road (Hse. Nos. 9, 11, 15; Parcel No. 120-14)	• State Road West (Hse. Nos. 80-192, 197; Parcel Nos. 84-1, 84-2, 85-4, 85-6, 86-5, 102-10, 102-12)
• Harrington Road	• State Road West-Rear (Parcel Nos. 84-7, 102-6, 103-1, 103-3, 103-7)
• Harrington Road-Rear (Parcel No. 160-18)	• Sunset Road
• Howard Road	• Syd Smith Road
• Kirali Center	• Syd Smith Road-Rear (Parcel No. 71-1)
• Kirali Center-Rear (Parcel No. 24-7.3)	• Taymax Road
• Knower Road (Hse. Nos. 49-339; Parcel Nos. 134-1, 134-2.1, 134-4, 134-13, 134-14, 151-8, 151-11, 152-2)	• Technology Drive (Parcel No. 81-7)
• Kurikka Place	• Town Farm Road (Hse. Nos. 39-47, 49-113; Parcel Nos. 78-4, 79-27)
• Lanes Road	• Turnpike Road (Hse. Nos. 7-68, 84-142; Parcel Nos. 93-9, 93-10, 93-11, 94-2, 96-5, 96-18, 112-13, 112-14, 113-18, 113-20)
• Laws Road	• Village Inn Road (Hse. Nos. 1, 19)
• Livermore Hill Road	• Waterman Lane
• Main Street-Rear (Parcel No. 108-26)	• West Main Street (Hse Nos. 186, 187; Parcel Nos. 67-1, 82-11, 82-19, 83-11, 83-14)
• Mark Newton Road	• West Princeton Road
• Marshall Hill Road (Hse. No. 17)	• West Princeton Road-Rear (Parcel Nos. 174-5, 190-7)
• Miles Avenue (Hse. Nos. 28, 30)	• Whitmanville Road
• Minott Road	• Whitney Street
• Minott Road-Rear (Parcel No. 105-10)	• Willard Road
• Mossman Road	• Woodland Drive
• Narrows Road (Hse. Nos. 2-70, 210; Parcel Nos. 114-1, 114-3, 114-5, 121-29, 121-33, 122-2)	• Woodland Drive-Rear (Parcel No. 59-12)
• Narrows Road-Rear (Parcel No. 121-23)	• Woods Road

• Needham Road	• Worcester Road (Hse. Nos. 22-134, 174-230, 241-319; Parcel Nos. 123-1, 123-3, 123-6, 123-7, 148-1, 148-5, 148-12, 148-14, 148-18, 162-2, 172-2, 172-4, 172-5, 172-6, 172-8)
• Newcomb Road (Hse. Nos. 2-4, 6, 8-61; Parcel Nos. 91-15, 91-22)	• Worcester Road-Rear (Parcel Nos. 172-3, 172-9, 172-10)
• Newton Road	• Wyman Road (Hse. Nos. 7-16; Parcel No. 121-1)

Planning Period-On-Site Wastewater Management Areas

The wastewater alternatives analysis (Chapter 7) identified three (3) needs areas where continued on-site wastewater management is the preferred approach over other available alternatives. The alternatives analysis determined that public health risks and impacts to sensitive resources were minimal, and that the on-site approach presented the most cost-effective wastewater management approach to property owners through the twenty-year planning period (2006-2026). When the planning period expires, the analysis should be revisited to determine if systems have degraded on a widespread basis or if cumulative effects have altered to create greater public health and/or environmental contamination risks that warrant sewer connections. These areas are listed in Table 7.10 and illustrated in Figure 7-12, attached to the end of this CWMP.

The parcels that comprise the Planning Period-On-Site Wastewater Management Areas are summarized in the following table:

Shady Avenue Area

• Miles Avenue	• Park Street
• Miles Avenue-Rear (Parcel Nos. 104-12, 104-13, 104-14)	• Ridge Street
• Norwood Street	• Spring Street
• Norwood Street-Rear (Parcel No. 104-47)	

State Road West

• State Road West (Hse. Nos. 47-76; Parcel Nos. 102-1, 102-1.2, 102-1.63, 102-5)	

Lake Drive West

• Ellis Road (Hse. Nos. 107-116, 120, 122, 124, 126, 132; Parcel No. 126-67)	• Lake Drive West

In general, areas that were determined to be suitable for on-site wastewater management contain conditions that can sufficiently support on-site systems through the planning period with a low risk of negative impacts. Some on-site systems in these areas may require upgrades to overcome site constraints that could include mounding the soil absorption system (SAS) and installing effluent pumps at the septic tank, or installing treatment units (I/A technologies); however, the great majority of these areas generally allow continued use of Title 5 management without onerous improvements and cost burden to owners.

8.2.3.2 Recommended Sewer Expansion Areas

The wastewater needs analysis (Chapter 4) identifies areas of Westminster where conditions significantly limit the use of conventional on-site systems and Title 5 management of systems causes one or more of

the following cumulative impacts: risks to public health, risks to nearby resources, and significant financial burden for property owners. The results of the needs assessment are based on the methodology outlined in Section 4.3 of Chapter 4, input provided by the Citizens Advisory Committee and the Technical Advisory Group for the CWMP, and the results of a public Wastewater Needs Workshop conducted during the needs analysis phase of the CWMP.

High Priority Sewer Expansion Areas

Sewer expansion is a high priority for six (6) needs areas. The wastewater needs analysis determined that continued use of on-site systems in these areas poses a threat to environmental resources, and in some instances, impacts to those resources are manifesting. The wastewater alternatives analysis (Chapter 7) determined that expansion of the existing municipal sewer system is the most beneficial and effective management alternative. These areas are listed in Table 7.10 and illustrated in Figure 7-12, attached to the end of this CWMP.

The parcels that comprise these High Priority Sewer Expansion Areas have been summarized in the following tables:

State Road East Industrial Area

• Bartherick Road (Hse. No. 25)	• North Common Road-Rear (Parcel No. 71-2)
• Bartherick Road Rear (Parcel No. 72-1)	• State Road East (Hse. Nos. 217, 219; Parcel No. 75-8)
• Industrial Drive	• State Road East-Rear (Parcel No. 76-21)

The State Road East Industrial Area was modified during the recommended plan phase of the CWMP. The DPW identified that a large parcel (No. 60-22) that abuts the Whitman River was recently acquired by the Town in October 2005 for conservation and recreation purposes. Therefore, this parcel was removed from the State Road East Industrial Area and added to the Conservation Areas. A few other parcels that were included in this area were removed and added to the On-Site Wastewater Management Areas. These parcels were verified to be existing residences or as zoned for future residential use and do not support the goal of this High Priority Sewer Expansion Area, which is to provide improved wastewater management to current and future industrial uses.

Eastern Westminster

• Fitchburg Road (Parcel No. 118-1)	

The Eastern Westminster Area was modified during the recommended plan phase of the CWMP. One parcel on the west side of Fitchburg Road (Route 31) was determined to be state conservation land and was removed from the Eastern Westminster Area and added to the Conservation Areas. A few parcels on the east side of Route 31 were determined to be the Fitchburg/Westminster landfill, which is currently served by a Fitchburg sewer main. These parcels were added to the existing sewer areas. A few other parcels that were included in this area were removed and added to the On-Site Wastewater Management Areas. These parcels were verified to be zoned for future residential use and do not support the goal of this high priority sewer area, which is to provide improved wastewater management to current and future industrial uses.

Lake Drive East Area

• Ellis Road (Hse. Nos. 68-94, 97, 101; Parcel Nos. 108-5, 108-7, 126-55)	• Lake Drive East-Rear (Parcel No. 126-28)
• Lake Drive East	

The Lake Drive East Area was modified prior to the recommended plan phase of the CWMP. The conceptual design to provide sewer service to the Lake Drive East Area requires installing a low pressure sewer extension along Ellis Road from the existing sewer pump station at the golf course to Lake Drive East. Since this sewer extension is necessary to provide service to the area, an additional 15 parcels along Ellis Road will receive sewer service since they abut the road. These Ellis Road parcels were added to the area.

Edro Isle Area

• Edro Isle Road	• Virginia Avenue
• Laurie Lane	• Washington Drive
• Laurie Lane-Rear (Parcel Nos. 138-34, 138-39)	• Worcester Road (Hse. No. 164)
• Patricia Road	

Lakewood Park Area

• Edgewood Avenue	• Lakewood Park Road (Parcel Nos. 138-9, 138-11, 138-19, 139-40)
• Edgewood Extension	• Linwood Avenue
• Garden Street	• Pine Road
• Genesee Avenue	• Shore Avenue
• Hill Road	• South Road
• Lakewood Park Road	

The Lakewood Park Area was modified prior to the recommended plan phase of the CWMP. The conceptual design to provide sewer service to the Lakewood Park Area requires installing a low pressure sewer extension along Lakewood Park Road to East Road. The low pressure sewer passes approximately 10 parcels along Lakewood Park Road; therefore, they were removed from the East Wyman Area and added to this area.

Leino Park Area

• Chestnut Street (Parcel 163-14)	• Parkwood Lane
• Honeybee Lane (Hse. Nos. 28-50; Parcel No. 163-5)	• Pine Street
• Honeybee Lane-Rear (Parcel No. 163-15.1)	• Ridge Avenue
• North Shore Road	• Wintturi Road (Hse. Nos. 2-12)
• Old Oak Avenue	

Additional High Priority Sewer Expansion Areas

During the Wastewater Alternatives Workshop, conducted on March 2, 2006, several residents from Dawley Road discussed adding a sewer project along Dawley Road to the High Priority Sewer Expansion Areas. Municipal sewer currently exists at both ends of Dawley Road. The residents signed a petition in 2003 to add Dawley Road to the sewer construction projects taking place at the time. The DPW approved

the petition, but the project did not receive a passing vote at Town Meeting to receive partial Town funding and was not constructed. This project should be made a priority since it was not incorporated in the most recent sewer projects. It would include Dawley Road, which begins at South Street and ends at Academy Hill Road. It would also include the unsewered portion of Academy Hill Road, from Dawley Road to Old Worcester Road. The total project would consist of 26 parcels, one of which is undeveloped. The undeveloped parcel is Town owned. Twelve of the parcels range between approximately 14,000 and 30,000 square feet in size. In addition to improved wastewater management, the project would provide resource protection to Meetinghouse Pond, the surface water supply for Fitchburg and Westminster drinking water that is located immediately south of these streets.

Consequently, these parcels were removed from the On-Site Wastewater Management Areas and designated as a high priority sewer area. This high priority sewer area has been summarized in the following table:

Dawley Road Area

• Academy Hill Road (Hse. Nos. 28-43; Parcel No. 110-91)	• Old Worcester Road (Hse. No. 2, Parcel No. 122-16)
• Dawley Road (Hse. Nos. 6-20, 26, 30-50)	• South Street (Hse. No. 44)
• Foster Street	• Worcester Road (Hse. No. 164)
• Marshall Hill Road (Hse. Nos. 2, 6)	

The Town Planner identified a Town owned parcel on Meetinghouse Road that has been designated for future development of affordable housing. Expanding Westminster's inventory of affordable housing is a priority for the Town and Daylor Consulting Group Inc. has already developed conceptual designs of various alternatives for the housing layout. The proposed development density and site conditions of this parcel will require a better wastewater management method than on-site management. Consequently, this parcel was removed from the On-Site Wastewater Management Areas and designated as a high priority sewer area. This high priority sewer area has been summarized in the following table:

Municipal Housing Parcel

• Main Street-Rear (Parcel No. 109-10)	

Low Priority Sewer Expansion Areas

Sewer expansion is a low priority for three (3) needs areas. The low priority areas and the high priority areas share many characteristics. Conventional on-site systems are not anticipated to meet the area's long-term needs; however, on-site wastewater management does not pose the same degree of difficulty and concern in these areas. In general, continued used of on-site systems in these areas is not likely to pose an immediate threat to environmental resources or cause imminent public health risks. However, conditions are expected to worsen towards the end of the planning period and require an improved solution. The wastewater alternatives analysis (Chapter 7) determined that expansion of the existing municipal sewer system is the most beneficial and effective management alternative. These areas are listed in Table 7.10 and illustrated in Figure 7-12, attached to the end of this CWMP.

The parcels that comprise these Low Priority Sewer Expansion Areas have been summarized in the following tables:

Bacon Street Area

• Bacon Street (Hse. Nos. 31-68; Parcel No. 99-20)	• Oakmont Avenue (Hse. No. 2)
• North Common Road (Hse. Nos. 3-67;	• Overlook Road (Hse. Nos. 2-21)

Parcel Nos. 79-53)	
• North Common Road-Rear (Parcel No. 89-23)	

The Bacon Street Area was modified during the recommended plan phase of the CWMP. Two parcels that were represented in the existing sewer areas were determined to not have access to sewer. They are located geographically within the Bacon Street Area; therefore, they were added to this area. A few other parcels that were represented in the On-Site Wastewater Management Areas were determined to have frontage along Bacon Street and North Common Road and are located geographically within the Bacon Street Area; therefore, they were added to this area also.

Bakers Grove Area

• Baker Drive	• Narrows Road (Hse. Nos. 71-141, 147, 151; Parcel Nos. 120-2, 120-31)
• Camp Pineshore (Parcel No. 121-15)	• Narrows Road-Rear (Parcel No. 121-13)
• Laurelwood Drive	• Wyman Road (Hse. No. 3)
• Linda Drive	

East Wyman Area

• East Road (Hse. Nos. 4-19, 59)	• South Shore Road
• Grassy Pond Road	• Winters Drive
• Mountain View Road	

This section detailed the areas of Town that the alternatives analysis efforts determined to be most appropriate for continued on-site wastewater management, high priority sewer expansion, or low priority sewer expansion. In addition, this section refined the results of the alternatives analysis with additional information acquired from the Town Planner and from citizen input during the alternatives workshop. The results include designation of the Dawley Road Area and a municipal parcel intended for affordable housing development as High Priority Sewer Areas. Under this plan, there are a total of eleven (11) areas of Town recommended for sewer expansion. Many of these areas are small and well defined. A common theme can be established through inspection of these individual areas: to provide improved wastewater management to portions of Town where Title 5 management of systems causes one or more of the following cumulative impacts: risks to public health, risks to nearby resources, and significant financial burden for property owners. This theme is reinforced by the characteristics of these areas such as containing very small lots, poor site conditions, nearby environmental resources, or current and future industrial uses.

8.3 Sewer Expansion Plan

This section provides information for implementing sewer expansion to the eleven (11) areas of Town previously summarized. In addition to proposed construction phasing and opinions of probable construction cost, this section includes the estimated number of lots proposed for sewer service and estimated wastewater flows and loads from these areas. The proposed scheduling may be subject to change based on available Town funding and support from residents and construction costs are inherently variable; however, this section should provide the Town with an understanding of the scope of the proposed sewer expansion plan consistent with a planning level document.

8.3.1 Construction Scheduling

In order to minimize construction impacts and disperse financial burdens over time, the CWMP advocates a phased approach to implementing the recommended sewer expansion plan. S E A has developed a proposed phased approach with a sewer construction schedule. However, to accommodate expansion of the existing municipal sewer system, several improvements must be made to increase the capacity of the system. The Town has noted that the sewer system is already experiencing problems accommodating wastewater flow from existing users; therefore, this project is the top priority for the Town. Expansions to the sewer system can follow once these improvements are made. There are also necessary capacity improvements downstream of the municipal sewer system, located in Fitchburg. The exact improvements that are necessary are not detailed until Section 8.4 since they are dependent on the size of the proposed sewer expansions and other factors such as planned affordable housing. The proposed phasing schedule identifies the necessary sewer system improvements as "Phase A" with the proposed sewer expansions following as "Phases 1 through 5." The phasing assumes that the CWMP will be complete by the end of 2006; therefore, 2007 was used as a baseline year. Table 8.1 summarizes the proposed sewer expansion phasing.

Table 8.1
Proposed Sewer Expansion Phasing
and Construction Schedule

Phase	Area	Town Meeting Appropriation	Construction Completion Year
A	Sewer System Capacity Improvements	2007	2009
1	Leino Park Area Lakewood Park Area Dawley Road Area	2008	2010
2	Lake Drive East Area Edro Isle Area	2010	2012
3	Bakers Grove Area East Wyman Area	2014	2016
4	Bacon Street Area	2018	2020
5	State Road East Industrial Area Eastern Westminster Area Municipal Housing Parcel (109-10)	N/A	Uncertain

N/A – Not Applicable.

Phase A consists of the recommended sewer system improvements, as detailed in Section 8.4 of this chapter. The Town should proceed with these improvements immediately; therefore, it is assumed that the appropriation will be made in 2007 and construction will be complete within 2-years, prior to completion of Phase 1. Phase 1 begins in 2008 with an estimated design and construction schedule of 2-years and Phase 2 follows with the same timeframe. These sewer areas are small and construction is expected to be generally straightforward. Phases 3 and 4 follow with 2-year intervals in between phases to space out the schedule for these lower priority areas and to lessen financing and construction impacts. The design and construction schedule for Phases 3 and 4 is also estimated to be 2-years each.

Phases 1 and 2 consist of high priority sewer expansion areas as detailed in Section 8.2 of this chapter. The Phase 1 areas are considered to have a greater need relative to the Phase 2 areas, based on information gathered during the wastewater needs and alternatives analyses. Section 4.5 of the wastewater needs analysis and Section 7.10 of the wastewater alternatives analysis provide discussion of the relative wastewater need between areas. Dawley Road is considered to be a high priority since construction was originally scheduled to occur with a past sewer project. Figure 8-1, attached at the end of this report (prior to appendices), details the Phase 1 and 2 areas.

Phases 3 and 4 consist of low priority sewer expansion areas as detailed in Section 8.2 of this chapter. Phase 5 consists of the State Road East Industrial Area, the Eastern Westminster Area, and the Municipal Housing Parcel, which were deemed high priority areas based on the results of the wastewater alternatives analysis and as described in the previous section of this chapter. These areas are included in Phase 5 since they are dependent on future development and they are not expected to require significant Town action for implementation. The State Road East Industrial and Eastern Westminster Areas contain undeveloped, industrial-zoned parcels. It is anticipated that the developer of these parcels would be responsible for extending the existing municipal sewer to these areas if sewer service is required for future development. The Municipal Housing Parcel is located adjacent to the existing municipal sewer area and would require a small sewer extension (approximately 550-feet) to extend sewer service to this parcel. Access to this parcel is provided from the end of Meetinghouse Road, off of which the Wellington affordable housing complex is located. This sewer extension can be installed when affordable housing is constructed on this parcel. These Phase 5 areas are included in the plan solely for the purposes of accounting for their estimated wastewater flow and impacts when developing the scope of Phase A – Sewer System Capacity Improvements. Figure 8-1 details the Phase 3, 4, and 5 areas.

8.3.2 Construction Cost

The Wastewater Management Alternatives Analysis provides some background of wastewater collection system technologies and components. Conceptual sewer system designs that were developed in that chapter were further refined to develop the sewer expansion plan presented in this chapter. The designs serve as the bases for estimates of probable construction cost. The designs utilize data collected for the wastewater needs and alternatives analyses. For example, the topography data dictated whether gravity sewer systems or low-pressure systems are feasible and cost-effective, and where pump stations would be placed, if necessary. Similarly, geological data helped to estimate where ledge may be prevalent and where blasting may be required thereby making sewer construction difficult and expensive. The optimal sewer system technology was selected for design to overcome these limitations and minimize cost. For example, the topography along Lake Drive East allows construction of a gravity sewer system that drains to Ellis Road, where a pump station could be installed to pump the collected wastewater to the existing pump station at the golf course. However, the homes located adjacent to Partridge Pond along this road are situated at a much lower grade than the roadway and could not drain by gravity to this type of sewer. Therefore, a low pressure sewer system was selected as the technology for use in the conceptual design for this sewer expansion area. It should be noted that if another sewer system technology is chosen during final design, it could impact the costs presented in this section of the report.

Table 8.2 summarizes the conceptual sewer system components and opinions of probable construction cost for each phase of planned sewer expansion. Since the extent of sewering is not certain for Phase 5, it is not included in the table. It was previously noted that a sewer extension of approximately 550-feet is necessary to provide sewer service to the Municipal Housing Parcel at the end of Meetinghouse Road, based on available mapping. But sewer collection systems needed to serve housing within that parcel are not certain at this time.

Table 8.2
Sewer Expansion Plan –
Opinions of Probable Construction Cost

	Unit Cost	Phase A	Phase 1	Phase 2	Phase 3	Phase 4	*Total*
Typical gravity sewer in street (ft)	$180	Refer to Section 8.4 for details regarding this phase.	0	0	5,100	0	*5,100*
Extraordinary gravity sewer in street (ft)	$220		4,750	0	1,000	6,200	*11,950*
Force main coincidental with gravity sewer (ft)	$60		550	0	0	1,550	*2,100*
Exclusive force main in street (ft)	$130		500	0	200	800	*1,500*
Number of minor (< 50 gpm) pump stations	$215,000		1	0	1	1	*3*
Number of major (> 50 gpm) pump stations	$455,000		0	1	0	1	*2*
Low pressure sewer (ft)	$110		15,300	13,350	6,850	0	*35,500*
Grinder pumps for low pressure sewer	$5,800		168	125	49	0	*342*
Total estimated cost for construction, easements, engineering, and contingencies		**$3.27 M**	**$4.02 M**	**$2.65 M**	**$2.42 M**	**$2.23 M**	**$14.59 M**

1. Opinions of Probable Construction Cost are based on October 2006, ENR 7883.
2. This table does not reflect costs associated with revisions to the intermunicipal agreement with Fitchburg and additional improvements to the Fitchburg sewer system from those evaluated in this chapter. Refer to Section 8.4.2 for more details.
3. The extent of sewering for Phase 5 is uncertain at this time.

The unit costs used to generate opinions of probable capital costs associated with extending sewers were previously developed during the wastewater alternatives analysis, as provided in Appendix D. These costs were updated for use in this chapter of the report based on historical construction costs for similar work. Costs for construction in Massachusetts communities located near Westminster were utilized where available. The typical gravity sewer category represents cost for sewer construction under typical conditions; whereas, the extraordinary gravity sewer category is provided to represent areas where conditions are likely to increase sewer construction cost. Examples include areas that are likely to consist of poor subsurface conditions and shallow bedrock, areas where the proposed sewer depth exceeds 10-feet based on the conceptual designs, densely developed areas of Town, and construction within state

roadways. The sewer force main categories are separated to represent costs for force main that is constructed along with a gravity sewer in the street and for force main that is constructed exclusive of any other sewer pipe. It is expected that there will be measurable construction economy when constructing a force main with an adjacent gravity sewer pipe. The pump station categories represent costs for pump stations with a capacity less than 50 gallons per minute (gpm) and for those with a capacity greater than 50 gpm. The pump station costs include an allowance for an easement for the station. The low pressure sewer category represents cost for installing low pressure sewer pipe. The grinder pump category represents cost for installing grinder pumps intended to serve typical residences in areas proposed to be served by low pressure sewer systems.

The Massachusetts General Laws (MGL) provide procedures for construction and maintenance of sewers and drains. Under the MGLs, it is stated that municipalities may construct a sewer system to provide service to certain properties and that it is generally the responsibility of property owners to connect to that system. Therefore, the costs presented in Table 8.2 do not include the cost of individual sewer services on private property or connection fees. The cost to install a gravity sewer service can vary and is mainly dependent on the setback distance of the establishment; however, it generally ranges between $1,000 and $3,000. The anticipated cost to install a low pressure sewer service is usually less.

Municipal gravity sewer systems are intended to be constructed to provide service to properties that drain or can be configured to drain by gravity to the sewer main located in the abutting street. The MGLs address this by not allowing a municipality to make assessments to properties that cannot be drained into the sewer system, "until such incapacity is removed (MGL Chapter 83, Section 15)." Certain properties included in the sewer expansion areas may not be able to drain into the proposed gravity sewer systems. However, the costs presented in Table 8.2 do not include pumps or systems that the property owner may need to install to be able to discharge to proposed gravity sewers, except for the grinder pumps listed in the table that are intended for areas proposed to be served by low pressure sewers.

The unit costs in Table 8.2 include a planning level contingency of 20-percent to compensate for the lack of refined design data and to provide adequate contingency to overcome potential construction obstacles. The rise in construction cost over time also demonstrates the need for proper contingency and careful planning. Over the past three years, the cost of construction has increased significantly; this is mainly due to increases in materials cost. And more recently, materials cost has risen dramatically. From July 2005 to July 2006 (12-months), average construction cost increased by 3.7-percent nationwide, based on the Engineering News Record (ENR) construction cost indexes. However, in the Boston area, construction cost increased by 8-percent over the same period, based on the ENR individual city data. Therefore, schedule impacts can significantly alter project cost.

Finally, the design and construction engineering cost was estimated to be 20-percent of the construction cost, including contingency, and was added to the unit costs to arrive at total unit costs as represented in Table 8.2. The total unit costs were applied to the estimated quantities of sewer pipe, pump stations, and/or grinder pumps necessary for construction in each sewer expansion area based on the conceptual designs. The conceptual designs for each area are provided in Appendix E of this report. The opinions of probable project cost (October 2006, ENR 7883) for each proposed phase, based on conceptual designs, are as follows: Phase A is $3.27 million, Phase 1 is $4.02 million, Phase 2 is $2.65 million, Phase 3 is $2.42 million, and Phase 4 is $2.23 million for a total of $14.59 million. Details regarding Phase A, including improvements to the Fitchburg sewer system, are provided at the end of this section. These capital expenditures are scheduled to occur from year 2007 through year 2020. As stated previously, delays in implementing this plan may have a significant impact on overall cost based on recent trends in construction. For instance, if implementation of the entire plan is delayed 5-years to 2012 and construction cost continues to rise at the same annual rate as observed in the ENR Boston area construction cost indexes, the overall estimated capital cost of the plan would increase to approximately

$21.44 million. This is based on an 8-percent increase in the ENR Boston area construction cost index from July 2005 to July 2006.

The proposed plan Phases 1 through 4 includes approximately 52,500 linear feet (9.9 miles) of sewer pipe, 3,600 linear feet of force main, 342 grinder pumps, 3 minor pump stations, and 2 major pump stations. One of the major pump stations represents a rehabilitation of the existing pump station at the golf course on Ellis Road to allow increased flow from the proposed Lake Drive East sewer expansion area. The Town is aware that by proposing grinder pumps, it must meet the ownership and maintenance requirements of the SRF program to qualify for funding assistance.

8.3.3 Sewer Expansion Area Details

This subsection details the characteristics of the proposed sewer expansion areas, and calculates the anticipated volume of wastewater flow from these areas, based on this information. In order to carefully plan and allocate for the proposed sewer expansion, the CWMP projects wastewater flows based on user classification. This information forms the basis for the recommended sewer system improvements, as detailed in Section 8.4 of this chapter. To estimate wastewater flow, S E A counted the number of parcels within each proposed sewer expansion area and then determined the total for each phase of the plan. The type of parcel (i.e. residential, commercial, industrial, or municipal) was identified using the 2005 Westminster assessors database. Table 8.3 details the number of parcels for each proposed phase of sewer expansion.

The plan proposes to provide sewer service to approximately 481 developed residential parcels and two developed non-residential parcels. The non-residential parcels are both located in the Bacon Street Area and consist of a small industrial facility and the DPW facility. S E A estimated the number of additional parcels within the sewer expansion areas that may be developed in the future through in-filling. In-filling refers to future development of existing parcels along the sewer route. These parcels may consist of large parcels that can be subdivided in accordance with current zoning or pre-existing "grandfathered" parcels that are currently undeveloped. S E A discussed the requirements for a "grandfathered" parcel with the Town Planner and reviewed the current zoning regulations to estimate the number of potential parcels, based on the assessors data. Both total parcel area and frontage along the proposed sewer route were used to determine the number of potential subdivided parcels. There are approximately 69 potential in-fill residential parcels within the plan and one potential non-residential parcel. The potential non-residential parcel is located in the Bakers Grove Area and consists of a large, commercial-zoned parcel. The parcel is currently developed, but has frontage along both Wyman Road and Narrows Road, and enough area to be subdivided into one additional parcel. Based on these details the proposed sewer expansion area in Phases 1 through 4 is 87-percent developed.

This plan does not account for secondary growth impacts (i.e. nearby subdivision connecting into the proposed sewer). It has been documented that large subdivisions in Westminster with access to the existing sewer system have the ability to significantly reduce the capacity of the system. The Whitman River Pump Station underwent a major upgrade in year 2000, and after 6-years, the pump station has already reached its capacity. As stated previously in this chapter, the goal of this Sewer Expansion Plan is to provide improved wastewater management to portions of Town where Title 5 management of systems is a major concern and a cost burden. Previous chapters of the CWMP detail extensive analyses that identify those areas, which have been made a part of this plan. Therefore, the capacity of the existing sewer system must be protected to preserve service for the Town's needs areas. Under current zoning in Westminster, the size requirements of future lots should allow implementation of Title 5 systems for new development. S E A stresses that future subdivisions should not be allowed to connect into the sewer system, and that within this planning period, the system capacity should be designated for existing areas of concern detailed in Section 8.2 of this chapter. The proposed sewer expansion areas are well defined

and do not include many large parcels capable of producing large subdivisions. However, the existing sewer area does have several large parcels within its limits and secondary growth is a concern. Implementation of this plan should include a management option that prohibits connecting to municipal sewers unless the development is located within the approved sewer district as recommended in Section 8.7.4 of this chapter. Title 5 wastewater management should be utilized for new development in the proposed On-Site Wastewater Management Areas.

Table 8.3
Sewer Expansion Details – Phases 1-4

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	***Total***
Number of Developed Residential Lots Served by Sewer	188	125	105	63	*481*
Number of Developed Non-Residential Lots Served by Sewer	0	0	0	2	*2*
Number of Potential Additional Residential Lots on Sewer Route Based on Frontage (i.e. In-Filling)	24	23	14	8	*69*
Number of Potential Non-Residential Lots on Sewer Route Based on Frontage (i.e. In-Filling)	0	0	1	0	*1*
Total Number of Lots (Current and Potential)	*212*	*148*	*120*	*73*	*553*
Initial Residential Flow (gpd)	37,600	25,000	21,000	12,600	*96,200*
Future Residential Flow (gpd)	4,800	4,600	2,800	1,600	*13,800*
Initial Non-Residential Flow (gpd)	0	0	0	600	*600*
Future Additional Non-Residential Flow	0	0	1,000	0	*1,000*
Additional Flow due to I/I (gpd)	1,800	0	2,310	2,350	*6,460*
Initial Flow Including I/I (gpd)	*39,400*	*25,000*	*23,310*	*15,550*	*103,260*
Total Flow Including I/I (gpd)	*44,200*	*29,600*	*27,110*	*17,150*	*118,060*

S E A had acquired historical Westminster water consumption data for use in Chapter 3 of the CWMP. That data was utilized to estimate average daily wastewater flow for each phase of the sewer expansion plan, as recommended in CWMP guidance and *TR-16 - Guides for the Design of Wastewater Treatment Works*. The data indicate that from 2001 through 2004, residential water use is approximately 198 gallons per day (gpd) per residence. The residential water use for year 2000 was approximately 55-percent of the four-year average, so it was excluded from the calculation. S E A utilized a value of 200 gpd per residence for estimating residential wastewater flow in Westminster to be conservative for the purposes of sizing sewer system components. Wastewater flow for the existing commercial and municipal parcels was based on actual water use acquired from the data. Wastewater flow for the potential commercial parcel was estimated based on average historical commercial water use in Westminster, which is 1,000 gpd per establishment.

Infiltration and Inflow (I/I) was estimated for all areas proposed to be served by gravity sewer systems. Since low pressure sewer systems and force main are pressurized systems, it was assumed that they are not subject to I/I. TR-16 suggests that the minimum allowance to be used for estimating I/I should be 250

gallons per day per inch diameter-mile of sewer length (gpd/in-mi). For instance, 1-mile of 8-inch diameter sewer is estimated to contribute 2,000 gpd of I/I. This allowance is conservative for modern sewer systems, as materials and construction methods continue to improve. Chapter 2 of the CWMP includes an estimate of current I/I rates in the Westminster sewer system, which appear to be less than 250 gpd/in-mi. Also, the DPW has been committed to locating and repairing I/I in the sewer system and intends to continue with future I/I studies and rehabilitation. However, to be conservative, S E A utilized 250 gpd/in-mi to estimate I/I from the proposed sewer plan. The total estimated I/I for Phases 1 through 4 is approximately 6,460 gpd. This small amount of I/I reflects the minimal extent to which low pressure sewer systems are proposed in the conceptual designs due to the constraints presented by several of the sewer expansion areas.

Phases 1 though 4 of the plan propose to expand sewer service in Westminster to 483 developed parcels with the potential for 70 additional parcels. The total estimated average daily wastewater flow for Phases 1 through 4 of the plan is approximately 118,000 gpd. Of this amount, 96,800 gpd is attributed to developed parcels, 14,800 gpd is attributed to potential development, and approximately 6,500 gpd is attributed to I/I.

Estimating wastewater flow for Phase 5 of the plan is not as straightforward as for Phases 1 through 4. Phase 5 consists of the State Road East Industrial Area, the Eastern Westminster Industrial Area, and a Town parcel designated for affordable housing development. These areas are currently undeveloped.

The State Road East Industrial Area consists of 6 undeveloped parcels that total approximately 336 acres. There is an industrial development plan for the parcels located off of Bartherick Road, which comprise approximately 251 acres of the total area. These parcels are collectively referred to as the Depot Business Park. The most recent development plan includes an approved Environmental Impact Report. The developer's consultant, CFS Engineering, indicated that the plan includes up to 1.57 million square feet mainly manufacturing and warehouse use with some office space. The consultant provided an estimated wastewater flow from this development of approximately 43,175 gpd. The type and size of future development for the remaining parcels is uncertain. Actual industrial water use in Westminster can be utilized to estimate wastewater flow for the remaining undeveloped parcels based on parcel area. Westminster water use data reinforces the variable nature of industrial water use. On a parcel area basis, industrial water use ranges between 40 gpd per acre and 1,200 gpd per acre, with an average of approximately 240 gpd per acre. To be conservative, S E A utilized a value of 300 gpd per acre to estimate future industrial wastewater flow. This value is for planning purposes and may be conservative, but it is intended to account for long term wastewater flow for sizing the recommended sewer system improvements. The remaining parcels total 85 acres, which equates to an estimated future wastewater flow of approximately 25,500 gpd.

The Eastern Westminster Area consists of one undeveloped parcel along Route 31 that is approximately 12.5 acres. This parcel does not appear to be associated with the Westminster/Fitchburg landfill, though it may be currently used by the landfill operators for storage. Based on the previous methodology, the estimated future wastewater flow is approximately 3,750 gpd.

The Municipal Housing Parcel is expected to consist of a development similar to the existing Wellington senior housing that is located adjacent to this parcel. The Wellington development consists of 30 senior housing units. The conceptual designs for the Municipal Housing Parcel, prepared by Daylor Consulting Group Inc., include 44 senior housing units and 40 to 60 additional affordable housing units. The affordable housing units will most likely have 2-bedrooms. S E A utilized a value of 200 gpd per unit, as established previously in this section, to estimate wastewater flow from this development. Senior housing generally contributes less flow than typical residential housing since the household size is smaller. However, the typical residential flow value was used to be conservative. This equates to an estimated

flow of 18,800 gpd, based on 44 senior housing units and an average of 50 additional affordable housing units.

I/I was estimated for this phase using mapping and assumptions of the likely layout of necessary sewer extensions only. All sewer extensions were assumed to consist of gravity sewers. Table 8.4 summarizes the Phase 5 areas and the estimated future wastewater flow.

Table 8.4
Sewer Expansion Details – Phase 5

	Area (acres)	Parcels	Future Flow (gpd)
State Road East Industrial Area	336	6	68,675
Eastern Westminster Area	12.5	1	3,750
Municipal Housing Parcel (109-10)	16.9	1	18,800
Additional Flow due to I/I			2,500
Total Flow Including I/I (gpd)	***365.4***	***8***	***93,725***

The total estimated average daily wastewater flow for Phase 5 of the plan is approximately 93,700 gpd. Of this amount, approximately 72,400 gpd is attributed to future industrial development, 18,800 gpd is attributed to future residential development, and 2,500 gpd is attributed to I/I.

8.4 Recommended Sewer System Improvements

It has been well documented throughout the CWMP that certain components of the Westminster municipal sewer system do not have adequate capacity to serve short term, and in some cases, current needs of the Town. Known capacity needs were identified within the Whitman River sewer system, which serves nearly the entire Town of Westminster. Capacity needs were not identified for the small sewer system located on Route 31. S E A prepared a *Municipal Wastewater System Capacity Analysis* (Capacity Analysis) for the Town in August 2004. The Capacity Analysis, attached as Appendix A, documented that the estimated wastewater flow to the Whitman River Pump Station was nearing its pumping capacity. In August 2005, S E A prepared a *Review of Mountain View Estates Water and Sewer Impacts* for the Town. This review detailed impacts on the municipal water and sewer systems from a proposed Chapter 40B housing development. It identified that the estimated wastewater flow to the Whitman River Pump Station had reached its pumping capacity, based on updated information. It also identified that estimated wastewater flow to the Narrows Road Pump Station had reached its pumping capacity. These pump stations require upgrades to increase pumping capacity and allow additional wastewater flow discharges to the sewer system.

In addition, Earth Tech conducted an evaluation of the Whitman River Pump Station in 1996 that includes a capacity analysis of the Fitchburg interceptor. The interceptor is the sewer pipe that conveys wastewater discharged by the Whitman River Pump Station into the City of Fitchburg for treatment. The evaluation indicates that approximately 3,600 linear feet of the interceptor has a limited capacity and will require an upgrade if Westminster significantly increases current wastewater flow. No other capacity needs within the Whitman River sewer system were identified.

8.4.1 Current and Future Wastewater Flow

The 2004 Capacity Analysis estimated current and future wastewater flow in the Westminster municipal sewer system. This subsection of the chapter updates those estimates with additional sewer use information collected over the duration of the CWMP.

The Capacity Analysis indicates that estimated average daily wastewater flow was approximately 120,000 gpd in 2004. Average daily flow was converted to peak hourly flow using a peaking factor obtained from TR-16 to estimate peak flow to the Whitman River Pump Station. I/I was estimated from flow records and included in the peak flow. This calculation yielded a peak hourly flow with I/I of 654,000 gpd, or 454 gallons per minute (gpm). Several sewer expansion projects were completed in Town approximately 2-years prior to the analysis, so S E A estimated future wastewater flow from the project areas. S E A also included future wastewater flow allotted to the Simplex Time Recorder Co. and from a development under construction with access to the sewer system referred to as the Village at Old Mill. The Capacity Analysis indicates that future average daily wastewater flow was estimated to be approximately 113,700 gpd in 2004. S E A applied a peaking factor and included future I/I to arrive at a future peak hourly flow with I/I of 592,600 gpd, or 412 gpm. The current and future wastewater flow estimates in the analysis total 866 gpm. The Whitman River Pump Station capacity was verified to be 500 gpm; consequently, it was revealed in 2004 that the pump station would require an upgrade in the near future.

The Mountain View Estates review, completed one year later (August 2005), illustrated that additional sewer connections since the previous study had caused wastewater flow to reach the capacity of the Whitman River Pump Station. The updated estimate of average daily flow was approximately 134,700 gpd in 2005. This estimate was converted to a peak hourly flow with I/I of approximately 730,400 gpd (507 gpm). The 2004 and 2005 capacity estimates consist of a current flow component and a future flow component. Therefore, since the estimate of current flow increased from 120,000 gpd to 134,700 gpd, it can be assumed that the estimate of future flow should decrease by the same amount. The updated (2005) estimate of future flow should be approximately 99,000 gpd, based on this assumption. These 2005 current and future flow estimates will serve as the baseline for updated wastewater flow estimates.

Additional sewer use information collected during the CWMP process must be used to update the 2005 flow estimates before recommending capacity improvements to the Whitman River Pump Station. The DPW identified a new sewer extension from Narrows Road that Fitchburg is planning to construct. However, it was not included in past flow estimates. The extension is under agreement to be constructed by Fitchburg and will serve several commercial establishments along Village Inn Road with a low pressure sewer. Earth Tech prepared the design and estimated the flow to be approximately 20,900 gpd based on Title 5 flow guidelines. The proposed Mountain View Estates Chapter 40B development that was reviewed by S E A in 2005 was approved and is under construction. The approved plan includes 136 units, which will consist of an equal number of 2-bedroom and 3-bedroom units located off of East Road. An estimate of wastewater flow for the approved design was not provided by the consultant for the project; however, a value of 200 gpd per unit, as established in Section 8.3, can be used to estimate wastewater flow from this development. This equates to an estimated flow of 27,200 gpd.

The Town Planner identified two additional future affordable housing developments that already have access to the sewer system and are expected to be developed within the planning period of the report. Wastewater flow from these developments should be included in overall flow estimates. The first is a proposed Chapter 40B development under review by the Planning Board. It is located at Adams Street and Main Street and the current proposal includes 24 housing units. The development will most likely consist of 2-bedroom units. Using the previous methodology to estimate wastewater flow from this development yields a flow of 4,800 gpd. The second development is a parcel recently acquired by the Town, located at 69 West Main Street. This parcel is proposed for affordable housing by the Town, similar to the one on Meetinghouse Road, except that it already has access to sewer. The Town Planner estimates that the development will consist of approximately 60 senior or affordable housing units and the units will most likely have 2-bedrooms. The estimated wastewater flow from this development is 12,000 gpd.

It should also be noted that Westminster is planning to develop a Smart Growth Zoning Overlay District (MGL Chapter 40R). The Town Planner anticipates a completed by-law within the next 2-years. The goal is to target the Town Center area for dense residential and mixed-use smart growth zoning districts, including a percentage of affordable housing units. Known parcels that will be included in the district have already been accounted for in the CWMP and are discussed in this chapter (Municipal Housing Parcel, 69 West Main Street, and the Adams Street and Main Street development). This district will allow new development and redevelopment to occur in Town Center with both greater density and mixed use. Although impacts from this planning initiative are unknown at this time, it is important to note that smart growth development in Town Center could increase future sewer flow since the area is already serviced by sewer.

Table 8.5 summarizes prior wastewater flow estimates and includes the additional information regarding future wastewater flow acquired from the Town. The table also includes the wastewater flow estimates from Phases 1 through 5 of the plan, summarized in Tables 8.3 and 8.4. Since the Whitman River Pump Station pumps virtually all wastewater flow from Westminster to Fitchburg, the pump station must eventually have enough capacity to handle this flow. It should be noted that flow from the Eastern Westminster Area of Phase 5 does not discharge to the Whitman River Pump Station; consequently, this flow (including I/I) was not included in the table.

Table 8.5
Current and Future Wastewater Flow
Whitman River Pump Station

	Estimated Flow (gpd)
Existing Sewer System Areas:	
Current Average Daily Wastewater Flow (2005)	134,700
Future Average Daily Wastewater Flow (2005)	99,000
Future Development/Sewer Extensions:	
Village Inn Road Extension	20,900
Mountain View Estates	27,200
Adams Street and Main Street development	4,800
69 West Main Street	12,000
Sewer Expansion Plan:	
Phase 1 – Total Flow without I/I	42,400
Phase 2 – Total Flow without I/I	29,600
Phase 3 – Total Flow without I/I	24,800
Phase 4 – Total Flow without I/I	14,800
Phase 5 – Total Flow without I/I	87,500
Total Average Daily Flow without I/I	*497,700*
Peaking Factor from TR-16	4.2
Peak Hourly Wastewater Flow	2,090,340
Estimated Infiltration and Inflow (Current and Future)	39,800
Peak Hourly Wastewater Flow with I/I	*2,130,140*
Flow Converted to Gallons per Minute	*1,480*

The peaking factor used to obtain estimated peak hourly flow was obtained from TR-16. It is lower than the peaking factor of 5.2 that was used in the 2004 and 2005 estimates. The peaking factor data in TR-16 is based on observed conditions and relates peak hourly flow to average daily flow. As average daily flow increases, the peaking factor decreases. The estimated total peak hourly flow with I/I from known current and future sewer users is approximately 2,130,140 (1,480 gpm).

The exact volume of wastewater flow that will discharge to the Whitman River Pump Station by the end of the 20-year planning period (2026) is uncertain, but it is not likely that it will equal the total flow listed in the table. Though many of the future flow contributors identified in Table 8.5 are anticipated to connect to the sewer system within the planning period, certain flow sources are uncertain. For instance, all flow from the Simplex Time Recorder Co. allotment (50,000 gpd) and from future industrial development within Phase 5 (87,500 gpd) may not occur within the next twenty years. Also, not all of the residential properties included in Phases 1 through 4 of the plan may connect to the sewer by the end of the planning period. Based on these considerations, a likely range of wastewater flow to the pump station by the end of the planning period could be roughly 400,000 gpd to 497,700 gpd on an average daily basis. This equates to a peak hourly wastewater flow range of roughly 1,719,800 gpd (1,194 gpm) to 2,130,140 gpd (1,480 gpm), including I/I.

It is recommended that improvements are made immediately to the Whitman River Pump Station to increase capacity to handle current and future flow. These improvements should consider the anticipated wastewater flow ranges within the planning period and beyond.

The Mountain View Estates review also assessed the capacity of the Narrows Road Pump Station. A pump test for the Narrows Road Pump Station was conducted by S E A in 2005, which yielded an estimated capacity of 220 gpm. This pump station serves residences in the southeast portion of Westminster and the Wachusett Mountain ski area. Wastewater discharges from the ski area are variable and mainly occur between the months of December and March. Peak hourly wastewater flow to the Narrows Road Pump Station was estimated to be approximately 370 gpm, which exceeds the pump station capacity. This estimate is conservative since it assumes that all four tributary pressure sewer systems are discharging at their peak flow rate simultaneously. The Narrows Road Pump Station has not historically experienced back-ups or overflows. Many of the flow contributors in Table 8.5 will discharge wastewater to the Narrows Road Pump Station en route to the Whitman River Pump Station. These include the Village Inn Road Extension, Mountain View Estates, and portions of plan Phases 1 and 2, and Phase 3. Table 8.6 provides an estimate of future wastewater flow to the Narrows Road Pump Station based on the same methodology used previously.

Table 8.6
Future Wastewater Flow
Narrows Road Pump Station

	Estimated Flow (gpd)
Future Development/Sewer Extensions:	
Village Inn Road Extension	20,900
Mountain View Estates	27,200
Sewer Expansion Plan:	
Phase 1 – Flow from Leino Park Lakewood Park Areas	35,400
Phase 2 – Flow from Edro Isle Area	18,600
Phase 3 – All Flow	24,800
Total Average Daily Flow without I/I	*126,900*
Peaking Factor from TR-16	4.2
Peak Hourly Wastewater Flow	532,980
Future Infiltration and Inflow	2,300
Future Peak Hourly Wastewater Flow with I/I	*535,280*
Future Flow Converted to Gallons per Minute	*372*
Existing Peak Flow in Gallons per Minute	*370*
Total Existing and Future Flow in Gallons per Minute	*742*

The future I/I estimate is very low because the conceptual designs propose to use low pressure sewer systems for the portions of Phases 1 and 2 that discharge to the Narrows Road Pump Station and the Village Inn Road Extension consists of a low pressure sewer system. The estimated total peak hourly flow with I/I from current and future sewer users is approximately 740 gpm. This flow is anticipated to occur within the planning period, though some residential properties within Phases 1 through 3 may not connect to the sewer within the planning period. It is recommended that improvements be made immediately to the Narrows Road Pump Station to increase capacity to handle current and future flow. No other capacity needs were identified for Whitman River sewer system.

8.4.2 Sewer System Upgrades

8.4.2.1 Whitman River Pump Station

As detailed in Chapter 2, the Whitman River Pump Station is located on the north side of Route 2A at the Whitman River crossing, west of the intersection with South Ashburnham Road. The station currently has a capacity of approximately 500 gpm and the updated (2005) estimate of peak hourly flow to the station is approximately 507 gpm. Based on estimates of wastewater flow from future sewer connections, future developments, and planned sewer expansions, flows into the Whitman River Pump Station are anticipated to increase by nearly three times in the future to approximately 1,500 gpm. Therefore, the Whitman River Pump Station will require significant upgrades.

Due to the complexity of the upgrades and the uncertainty of some of the assumptions, the analysis summarized in Table 8.5 should be reviewed during preliminary design to confirm the basis of design for the Whitman River Pump Station and force main upgrades.

8.4.2.1.1 Conceptual Improvements

The Whitman River Pump Station will require a substantial increase of capacity and size; therefore, a new pump station will be needed. The current pump station site has very limited available space and is most likely too small for installing the necessary components of a new pump station. The new location of the pump station is not restricted to the immediate vicinity of its current location; consequently, alternative sites will be reviewed during the preliminary design.

For sizing pump stations that will receive flows in excess of 500 gpm, S E A generally recommends utilizing three pumps. Under this arrangement, two pumps operating together would provide the estimated design flow of 1,500 gpm, with the third pump available for redundancy. S E A recommends that active duty pumps are used on a rotating basis, to ensure that all three pumps age in concert. S E A also recommends that variable frequency drives (VFDs) be installed with the new pumps. VFDs will allow the pump station to operate with less power consumption, and with less frequent pump start-ups.

The wet well for the Whitman River Pump Station should be large enough to prevent the pumps from cycling excessively, yet small enough to prevent odor and sulfide problems and unnecessary capital expenditures. For a pump station as large as this one, it is recommended that the wet well be constructed in a duplex configuration. This will allow the Town to remove one side of the wet well for service, while the other side is in operation.

The pump station currently has a 6-inch diameter force main with an average velocity of 5.7 feet per second, which is generally at the recommended maximum velocity for a force main of that diameter. The estimated future flows from the station will require a larger force main. It is recommended that a 12-inch force main replace the existing 6-inch force main from the Whitman River Pump Station to the Fitchburg Interceptor. The velocity of the estimated flows within a 12-inch force main is approximately 4.3 feet per second, which is within the desired velocity range. It is our understanding that the pump station force main from the West Hill Drive development connects into the force main from the Whitman River Pump Station. This connection is not recommended as it may cause failure and back-ups at the West Hill Drive Pump Station. Therefore, a new force main should be installed adjacent to the Whitman River Pump Station force main from the West Hill Drive Pump Station to the Fitchburg Interceptor. We have assumed that this force main diameter is 4-inches for cost estimating purposes.

Based on recent construction bids for wastewater pump stations of similar size, the opinion of probable cost for a new Whitman River Pump Station as described previously is approximately $1.5 million. This includes a value of $100,000 as an approximation of the cost to acquire a site for the new pump station. S E A reviewed assessed land values in the area of the existing pump station site and noted that this value is conservative. The estimated construction duration is approximately 9-months. The opinion of probable cost for the force main upgrade is approximately $510,000. This is based on 2,700 feet of force main, a unit cost of $130 per foot for the 12-inch diameter force main, and an additional $60 per foot for the materials cost of the adjacent 4-inch force main for the West Hill Drive Pump Station. This project would occur along Route 2A, a major state roadway. Based on a review of the record drawings for the existing force main, S E A has assumed the replacement force mains can be installed in the shoulder, off of the pavement. If this is not feasible, construction costs will likely be higher due to the stricter workday and roadway restoration requirements of the Massachusetts Highway Department. These opinions of probable cost are based on October 2006 dollars and include a planning-level contingency of 20-percent. They also include design and construction engineering cost as 20-percent of the construction cost, including contingency. These opinions of probable cost should be refined during preliminary design.

8.4.2.2 Narrows Road Pump Station

The Narrows Road Pump Station is located along Narrows Road, south of Route 2A at the intersection with Village Inn Road. The pump station currently has a capacity of approximately 220 gpm and the updated (2005) estimate of peak hourly flow to the station is approximately 370 gpm. The station has a similar configuration as the Whitman River Pump Station, except that the wet wells and pumps were never upgraded. The pump station has a single 6-foot diameter wet well and a 6-inch diameter force main. Based on estimates of wastewater flow from future sewer connections, future developments, and planned sewer expansions, peak flows into the Narrows Road Pump Station are anticipated to double in the future to approximately 740 gpm. Therefore, the Narrows Road Pump Station will require significant upgrades.

8.4.2.2.1 Conceptual Improvements

S E A recommends for the interim period that the Narrows Road Pump Station be upgraded with new pumps and motors in order to maximize the capacity of the pump station under its current configuration. Based on record drawings and the results of past upgrades to the Whitman River Pump Station, it appears that upgrades to the Narrows Road Pump Station could result in a maximum capacity of approximately 500 gpm. An additional wet well and a generator for emergency power supply should be installed at this pump station since proposed development and the proposed sewer expansion projects would significantly increase peak flow into the pump station. During a previous study, S E A estimated that the peak hourly flow to the Narrows Road Pump Station exceeds its capacity, yet the station does not appear to experience backups or overflows. Therefore, the Town should monitor sewer flow to the Narrows Road Pump Station after completion of the recommended interim improvements to determine if it is approaching the estimated future peak hourly flow rate of 740 gpm. At that time, it can be determined if a new pump station and force main are needed at Narrows Road. If the force main is upgraded, it is recommended that an 8-inch force main replace the existing 6-inch force main, which is approximately 2,200 feet in length.

Based on the actual construction cost for the Whitman River Pump Station upgrade, the opinion of probable construction cost to upgrade the Narrows Road Pump Station is approximately $370,000. This opinion of probable cost is based on October 2006 dollars and includes contingency and engineering.

8.4.2.3 Fitchburg Interceptor

As detailed in Chapter 2, the Fitchburg interceptor was evaluated in 1996 and determined to have a limited capacity. The interceptor conveys wastewater flows from the discharge point of the Whitman River Pump Station into the Fitchburg sewer system, which discharges to the East Fitchburg Wastewater Treatment Facility. Earth Tech evaluated the interceptor in 1996 for a distance of approximately 9,500-feet from the discharge location of the Whitman River Pump Station into the City of Fitchburg. S E A Consultants and representatives from Westminster met with the City of Fitchburg in September 2006 to obtain information and to discuss the conditions of the portion of the Fitchburg sewer system between the interceptor and the treatment facility. The Fitchburg DPW indicated that recent sewer system improvements have increased available sewer capacity in West Fitchburg, and that there are not any known sewer system capacity limitations other than the Fitchburg interceptor, given the estimated wastewater flows presented in this CWMP. Therefore, the CWMP analysis is limited to the 9,500-feet of interceptor previously evaluated.

8.4.2.3.1 Conceptual Improvements

Earth Tech estimated that the interceptor has a maximum capacity of approximately 760 gpm, due to some limiting reaches of sewer. Based on estimates of wastewater flow from future sewer connections, future developments, and planned sewer expansions, the Fitchburg interceptor capacity is expected to be exceeded in the future.

Based on information provided in the Earth Tech evaluation, it is recommended that approximately 1,200 linear feet of 8-inch sewer and 2,400 linear feet of 12-inch sewer within the Fitchburg interceptor be replaced with 18-inch sewer to achieve the required capacity. The existing Palmer-Bowlus flume and flow meter at the Montachusett Regional Vocational Technical School will require replacement to increase its metering capacity also. This conceptual improvement was discussed with the City of Fitchburg at the September 2006 meeting. The City did not identify any concerns with the proposed improvement. This chapter does not include costs for upgrades to the Fitchburg sewer system in addition to the interceptor.

Based on recent construction bids for sewer construction, the opinion of probable cost to upgrade the Fitchburg interceptor is approximately $900,000. This is based on a unit cost of approximately $250 per linear foot and 3,600 linear feet of 18-inch interceptor. A higher unit cost was used for the construction of this sewer than that provided in Table 8.2 because the proposed sewer has a large diameter and is located entirely within a busy state roadway. The cost could increase if future input from the City reveals that a larger capacity is needed or additional improvements to downstream portions of the sewer system are necessary. This opinion of probable cost is based on October 2006 dollars and includes contingency and engineering.

8.4.2.4 Conclusion

Based on an understanding of existing sewer system conditions in Westminster, and estimates of wastewater flow from future sewer connections, future developments, and planned sewer expansions, several upgrades to sewer system components are necessary prior to expanding the municipal sewer collection system any further. The components include the Whitman River Pump Station and force main, the Narrows Road Pump Station, and the Fitchburg interceptor. Both the Whitman River Pump Station and the Narrows Road Pump Station currently appear to be at their capacity limits, while the Fitchburg interceptor has a limited capacity remaining. Opinions of probable construction cost (October 2006, ENR 7883) for these upgrades are as follows: approximately $2.0 million for the Whitman River Pump Station and force main, approximately $370,000 for the Narrows Road Pump Station, and approximately $900,000 for the Fitchburg interceptor. The opinions of probable cost total $3.27 million.

8.4.3 Intermunicipal Agreement

The latest Intermunicipal Agreement (IMA) with Fitchburg for wastewater disposal indicates that the Town may discharge up to 320,000 gpd of wastewater to Fitchburg. The flow values expressed in the IMA are average daily flows to be based upon a minimum measuring period of 28 days. For the purposes of this analysis, S E A has interpreted this to mean a maximum measuring period of 28-days. Of this amount, 250,000 gpd may be discharged through the Route 2A metering station and 70,000 gpd through the Route 31 metering station. The wastewater flow originating from the Whitman River sewer system discharges to the metering station along Route 2A. As part of the 2004 Capacity Analysis, the largest 28-day flow was obtained from wastewater flow records to compare with the IMA discharge limit of 250,000 gpd. The largest average daily flow measured over a 28-day period at the meter was approximately 170,000 gpd in March 2003, based on 2002/2003 flow data provided by the DPW.

Based on the estimates of future wastewater flow in Table 8.5, Westminster may discharge an additional 370,000 gpd of wastewater (including I/I) to Fitchburg for treatment by the end of the planning period. Adding this to the March 2003 measured flow of 170,000 gpd yields a total potential average 28-day flow of approximately 540,000 gpd. Based on this range and the IMA discharge limit of 250,000 gpd, Westminster may more than double the limit by the end of the planning period.

As discussed in the 2004 Capacity Analysis, the IMA with Fitchburg does include provisions that allow Westminster to exceed the limits without penalty: "Based on provisions of the amended IMA, the Town

of Westminster could exceed the IMA limits without penalty (at the most recently adopted rate structure of $2.50 per 100 cubic feet for volumes greater than the combined 320,000 gpd limit currently established). Until such time as the City of Fitchburg provides their comprehensive I/I study to Westminster, there is no plan by which Westminster could increase their permitted limits based on improvements to the Fitchburg system." The IMA indicates that the Town could increase allowable flows to Fitchburg at a rate of 1:1 for each gallon of I/I removed from the Fitchburg system via repairs or rehabilitation recommended by the I/I study and funded by the Town of Westminster.

The IMA was a subject of the September 2006 meeting with the City of Fitchburg. S E A discussed the details of the most recent IMA and the status of the Fitchburg I/I study. The Fitchburg DPW indicated that the I/I study is not expected to be complete for some time; however, there are enough findings to provide a plan to allow Westminster to increase the permitted discharge limits of the IMA through financing equivalent I/I removal in Fitchburg, as provided by the IMA. There is also the potential for reducing the allowable discharge limit through the Route 31 metering station and increasing the allowable discharge limit through the Route 2A metering station by the same amount. Recent reconfiguration of the Fitchburg sewer system now causes discharges through the Route 31 metering station to flow to the same treatment facility in Fitchburg as discharges through the Route 2A metering station; therefore, there is no net impact of this rebalance. Also, analyses conducted in this CWMP indicate that wastewater flows through the Route 31 metering station are not expected to exceed 5,000 gpd within the planning period. As a conservative measure, the discharge limit at Route 31 could be reduced from 70,000 gpd to 10,000 gpd. Consequently, the discharge limit at Route 2A could be increased by 60,000 to 310,000 gpd.

The Fitchburg DPW indicated that the regional water treatment facility, located in Westminster and operated by Fitchburg, will be connecting a treatment residuals disposal line to the Westminster sewer system in the future. Neither the Fitchburg DPW nor the Fitchburg Water Division could provide details as to when this connection will occur or what the estimated flow will be. However, the Fitchburg DPW suggested that when this connection occurs, it will likely be a cause to revise the IMA if it has not already occurred. The Westminster DPW and Town Counsel should contact Fitchburg City officials prior to implementing the plan to determine available wastewater treatment capacity and the likely cost of increasing the IMA discharge limits through financing I/I removal. Since this information has not been provided by the City of Fitchburg, no cost attributed to revisions to the current IMA with Fitchburg has been included in Table 8.2 or elsewhere in this chapter.

The MA-DEP has indicated that the Town of Westminster should include a revised IMA with the City of Fitchburg (or at least a substantially complete IMA), with the final CWMP. It was acknowledged that this level of detail was not a prerequisite for MEPA approval, but MA-DEP would require this information before endorsing the plan and allowing the Town to implement its recommendations.

8.5 Conceptual Designs

The conceptual designs referred to in previous sections of this chapter are provided in Appendix E of the report. The designs are provided at a scale that depicts general layout of sewers, pump stations, and grinder pumps for each sewer expansion area of each phase. S E A used the 100-scale base mapping that was prepared for the Town in 2000 for survey data and obtained elevation contours from the Massachusetts Geographic Information System (MassGIS) for topography data. The existing GIS assessors data and sewer system layers were used as map overlays to determine development characteristics in each area and the locations for connecting into the existing sewer system. The conceptual designs are based on the available information previously described and site visits that were performed during the development of the sewer expansion plan.

The conceptual designs are generally described for each sewer expansion area in Phases 1 through 4 as follows:

- Leino Park Area – Due to varying topography and shallow depth to groundwater, the entire area is proposed to be served by a low pressure sewer system that connects to the existing sewer system at East Road. This stretch of East Road already contains a force main and a low pressure sewer. Part of the Phase 1 design should include an evaluation of upgrading the existing low pressure sewer on East Road to accommodate additional flow from the expansion areas in order to avoid adding a third sewer pipe to this portion of East Road. A bridge crossing or directional drilling will be necessary to connect across Wyman Pond to Leino Park Road. It should be noted that there is a proposed low pressure sewer connection from the Edro Isle Area at Parkwood Lane.

- Lakewood Park Area - Due to varying topography and shallow depth to groundwater, the entire area is proposed to be served by a low pressure sewer system that connects to the existing sewer system at East Road.

- Dawley Road Area – The topography of this area is challenging. The proposed design includes three separate gravity sewer systems. One connects to the existing sewer system on South Street, another connects at East Main Street, and the third is located in the middle of Dawley Road and requires a pump station to discharge to the proposed gravity system that connects at East Main Street. A small portion of low pressure sewer is required also.

- Lake Drive East Area - Due to varying topography and existing homes well below street grade, the entire area is proposed to be served by a low pressure sewer system that connects to the existing sewer pump station at the golf course on Ellis Road. This pump station will require an upgrade.

- Edro Isle Area - Due to varying topography and shallow depth to groundwater, the entire area is proposed to be served by a low pressure sewer system that connects to the Leino Park Area at Parkwood Lane. A portion of low pressure sewer along Patricia Road must be installed at grade, adjacent to the roadway in order to cross two culverts. There is not adequate separation between the top of the culverts and the roadway; therefore, the sewer pipe must be installed within an insulated pipe encasement. An easement from three property owners will be required for a total length of approximately 1,500 feet to connect the system from Washington Drive to Parkwood Lane. The proposed sewer can be installed within existing access roadways and adjacent to property lines to access the Leino Park Area.

- Bakers Grove Area – Most of the area is proposed to be served by a gravity sewer along Narrows Road that connects to the proposed gravity sewer for the East Wyman Area at East Road. A pump station is necessary at the connection point to convey wastewater over the culvert at the outlet from Wyman Pond. Portions of the area adjacent to Wyman Pond are proposed to be served by low pressure sewers that discharge to the proposed gravity sewer. Approximately seven parcels along Laurelwood Drive in this area are proposed to be served by a low pressure sewer system that connects to the proposed low pressure sewer on Laurie Lane in the Edro Isle Area. These homes may be eliminated from the final design if they are determined to be too costly to include in the plan.

- East Wyman Area - Most of the area is proposed to be served by gravity sewers along East Road and Narrows Road that connect to the existing sewer system at the Narrows Road-Stone Hill

Road intersection. Portions of the area adjacent to Wyman Pond are proposed to be served by low pressure sewers that discharge to proposed and existing gravity sewers along East Road.

- Bacon Street Area – The area is proposed to be served by two separate gravity sewer systems. One flows south from Overlook Road and North Common Road to a pump station on Bacon Street at Route 2, which connects to the existing sewer system on Bacon Street at Elliot Road. It may be determined during the design that this pump station is not necessary. The other sewer flows north on North Common Road to a pump station at the DPW facility, which discharges back to the other proposed gravity sewer. A portion of sewer on Bacon Street will be required to be installed deep due to existing topography.

8.6 Assessment of Impacts

S E A evaluated direct impacts from the proposed sewer expansion plan and gradual impacts that occur over the twenty-year planning period. In order to evaluate gradual impacts, an estimate of the average annual wastewater flow for all sewer phases over the twenty-year planning period (2006-2026) is needed. This effort required some broad assumptions regarding the actual schedule of sewer expansion and the resulting wastewater flow. Using the flow estimates in Tables 8.3 and 8.4, the average annual wastewater flow from Phases 1 through 5 was approximated over the twenty years from 2006 to 2026. The initial wastewater flow for Phases 1 through 4 was assumed to occur upon project completion, based on Table 8.1. The estimate assumes that all developed parcels will connect to the sewer upon project completion and that the projects will remain on schedule. Although some owners may not connect immediately, it is anticipated that all owners will eventually connect. A portion of the future wastewater flow from developable parcels was included within the planning period based on the assumption that half of the potential parcels will be developed and connected to the sewer within the 20-year planning period. For Phase 5, the estimated wastewater flow is based on the assumption that all areas listed in Table 8.4 experience development between 2015 and 2026, with 75-percent of development occurring by 2026. Based on current information, some areas of Phase 5 may be developed sooner, but this assumption was made to represent average conditions within the Phase 5 areas.

The estimated average annual wastewater flow from all phases of sewer expansion plan is approximately 108,900 gpd over the planning period. This amount is much lower than the total estimated flow for all five phases (211,400 gpd) because each phase of sewer is not scheduled to be complete until well into the planning period, and it is assumed that not all potential parcels will connect within the planning period.

8.6.1 Water Quality and Public Health

The recommended plan targets sewer extensions to areas located near surface waters used for drinking water supply and recreational use. It also provides sewer service to areas of dense development that rely on on-site wells for drinking water supply. The plan is expected to remove pollutant loads and risks of contamination to these sources of drinking water and recreation. The Nashua River Basin will also receive overall benefits that will include reduced nutrients and suspended solids loads.

Based on the previous estimate of average planning period wastewater flow, the Phase 1 through 4 projects would reduce nitrogen loads to the basin by approximately 6,400 pounds and phosphorous loads by approximately 1,900 pounds annually within the planning period. This calculation assumes a typical wastewater nitrogen load of 40 mg/L, a typical phosphorous load of 10 mg/L, and typical nitrogen and phosphorous removal efficiencies from sewer systems of 75-percent and 90-percent, respectively. Similarly, the Phase 1 through 4 projects are expected to remove total suspended solids loads from wastewater effluent by over 54,000 pounds annually, assuming a typical load of 300 mg/L and an average removal efficiency of 85-percent. For the Phase 5 project, average nutrient removal within the planning period is estimated to be approximately 3,500 pounds and 1,100 pounds annually for nitrogen and

phosphorous, respectively. Total suspended solids removal within the planning period is estimated to be approximately 30,200 pounds annually.

In addition to these water quality benefits, the sewer expansion plan is expected to prevent potential effluent breakout occurring from failing subsurface disposal systems in dense residential areas. This benefits public health by preventing direct exposure to residents and by preventing contact with stormwater runoff and nearby recreational surface water bodies.

8.6.2 Environmental Impacts

The sewer expansion plan is similar with regard to scope of work and construction methods to other typical utility installation projects, and no significant environmental impacts are anticipated to occur. Based on the conceptual designs, virtually all sewer and force main is proposed within existing roadway rights-of-way in Westminster. Most of those roadways are paved surfaces also. Minor easements are necessary to connect certain phased areas. These easements are proposed along property lines, but the actual locations will be selected to avoid impacts to any environmental resources discovered during survey, such as wetlands and vernal pools.

It is anticipated that the proposed sewer expansion plan will require submission and approval of an Environmental Impact Report (EIR) through the Massachusetts Environmental Policy Act (MEPA) Office of the Executive Office of Environmental Affairs (EOEA). The length of proposed sewer main just exceeds the review threshold for an EIR [301 CMR 11.03 (5a)]; however, no other review thresholds were identified as being exceeded. The Town has already performed substantial evaluations of the proposed plan and its impacts in this CWMP; therefore, an Expanded Environmental Notification Form (ENF) is being submitted with a request for a Single EIR. The following narrative provides a brief overview of anticipated impacts based on the conceptual designs for informational purposes. The overview follows the general format of an ENF:

Land Section:

- The proposed plan is not expected to meet or exceed MEPA review thresholds related to land.
- The proposed plan does not alter: sites within the project areas, agricultural areas, forestry lands, Article 97 conservation lands, or restricted-use lands.
- The proposed plan includes three small wastewater pump stations. These pump stations will consist of small enclosures that are located on easements either at grade or below grade. The plan also includes upgrades to three existing pump stations.
- Potential stormwater impacts from construction will be mitigated. A brief narrative of proposed mitigation measures is provided in Section 8.7.
- Areas regulated under MGL Chapter 21E or the Massachusetts Contingency Plan were not identified within the properties included in the plan.
- The project is entirely within the Nashua River Basin but not within the Quabbin, Ware, or Wachusett sub-basins.
- The project does not propose use of land designated for current or potential open space in Town.

Rare Species Section:

- The proposed plan is not expected to meet or exceed MEPA review thresholds related to rare species.
- Estimated and priority species habitats were not identified within the proposed project areas based on the MassGIS Natural Heritage and Endangered Species Program data.

Wetlands, Waterways, and Tidelands Section:

- The proposed plan is not expected to meet or exceed MEPA review thresholds related to wetlands, waterways, and tidelands.
- Based on MassGIS interpreted wetlands and waterways data, the proposed plan will likely require construction adjacent to existing wetlands and riverfront. Therefore, a local Order of Conditions will be required, though no alterations to wetlands, waterways, or tidelands are proposed.

Water Supply Section:

- The proposed plan is not expected to meet or exceed MEPA review thresholds related to water supply. The existing water system contributes to an interbasin transfer as identified in the Wastewater Section.
- The recommendations of this plan do not include any projects at this time that require state permits related to water supply.

Wastewater Section:

- The proposed plan exceeds one EIR review threshold related to wastewater. This threshold is the proposed construction of new sewer mains in excess of ten miles in length. The total proposed length of new sewer main under the recommended plan is just above the EIR review threshold of ten miles or more.
- The project will require a MA-DEP sewer extension permit and the estimated wastewater flow volumes from the proposed plan are included in this chapter of the report.
- The proposed capacity improvements to the existing municipal sewer system provide adequate capacity to manage the increased flow.
- There exists sufficient treatment capacity at the Fitchburg treatment facility for the additional wastewater flow and residuals.
- This proposed sewer plan does not create a direct interbasin transfer; however, a transfer of 0.08 mgd does occur when coupled with the existing municipal water system. This is discussed in Section 8.8 of this chapter.
- The proposed plan is consistent with the Nashua River Watershed *5-Year Action Plan* to protect water quality in the basin and facilitate wastewater facilities planning in Westminster.

Transportation Section:

- Though minor roadway improvements may occur in conjunction with pavement restoration during the projects, the proposed plan is not expected to meet or exceed MEPA review thresholds related to transportation.

Energy, Air Quality, and Solid and Hazardous Waste Sections:

- The proposed plan is not expected to meet or exceed MEPA review thresholds related to the above sections.

Historical and Archeological Resources Section:

- A portion of Phase 1 of the plan is located within the state listed "Westminster Village – Academy Hill Historic District." This area is the only remaining portion of the historic district that is not currently sewered. The plan is not expected to have negative impacts to this portion of the historic district, which is currently developed.
- No other state listed historical or archeological sites were identified within the project areas using the MassGIS state register data.

The following section discusses management options and proposed mitigation measures to minimize potential impacts from the recommended plan.

8.7 Management and Mitigation Plan

This proposed management and mitigation plan, summarizes the short-term (pre-construction and construction phase) and permanent (post-construction and operation phase) measures proposed to avoid, minimize, or mitigate potential impacts and damage to the environment of the proposed plan. This section serves as a Section 61 Findings and details potential pre-construction, construction phase, and post-construction impacts and also considers management strategies and mitigation measures to deal with those impacts. Through this plan, the Town of Westminster will be prepared to implement these mitigation measures as necessary to carry out the overall recommended plan.

It has been well demonstrated that this recommended plan supports Executive Order 385, whereby state and local agencies must engage in proactive and coordinated planning oriented toward both resource protection and sustainable economic development. By virtue of targeting sewer expansion for areas zoned for future industrial development, the plan "promote(s) sustainable economic development in the form of; a) economic activity and growth which is supported by adequate infrastructure and which does not result in, or contribute to, avoidable loss of environmental quality and resources, and b) infrastructure development designed to minimize the adverse environmental impact of economic activity." The CWMP also engaged in "proactive planning (and) interagency coordination" by working with the Town Planner to identify current and future affordable housing developments and planning initiatives that should be targeted for inclusion in the sewer plan. The CWMP supports "local or regional growth management plans" such as the Westminster Community Development Plan (Executive Order 418), the Draft Master Plan, and the Open Space and Recreation Plan. Finally, the end of this section (8.7.4) addresses the subject of future growth in Westminster.

8.7.1 Pre-Construction Phase Mitigation

Sewer extensions have the potential to place additional burden on the municipal sewer system. The CWMP recommends a sewer expansion plan that together with a Sewer District By-Law or a Wastewater Management District, balances the need to protect resources and improve wastewater management in critical areas of Town. In addition to improving water quality, the plan also seeks to preserve water quantity by minimizing water exports from stressed sub-basins of the Nashua River Watershed. However, prior to enactment of a Sewer District By-Law or forming a Wastewater Management District, which is essential to achieving the goals of the plan, the potential exists for sewer extensions that do not meet the strict criteria detailed in the CWMP. Therefore, until such time as these management strategies are enacted, the Town proposes to maintain the current sewer moratorium on any and all sewer extensions that are not vital to protect the public health as determined by both the Westminster Board of Health and the MA-DEP.

8.7.2 Construction Phase Mitigation

Construction activities have the potential to cause some short-term impacts to soils, surface water, and air quality in the immediate vicinity of the project location. These impacts will be mitigated through the use of Best Management Practices (BMPs) for construction projects. BMPs are intended to ensure that construction activities do not result in adverse impacts to environmental resources, either on the construction site or at adjacent off-site locations. Activities will also be coordinated with the Town's local NPDES Phase II Stormwater Management Plan and regulations. This listing presented below, although not all-inclusive, indicates the types of actions that would be undertaken during the construction phase of the plan to ensure that unacceptable impacts do not occur.

- Erosion and sedimentation control measures shall be installed and functional before excavation operations begin and shall be properly maintained throughout the construction period.

- Regular maintenance is vital to the success of the erosion and sedimentation control systems. All control measures shall be checked weekly and after each rainfall.

- Clearing and grubbing shall be held to a minimum as necessary for grading and equipment operation.

- Construction shall be sequenced to minimize the exposure time of cleared surface areas. Grading activities shall be avoided during periods of high rainfall.

- Construction shall be staged in sections. Areas disturbed for each section shall be stabilized immediately upon completion of the section. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and run-off and/or repaving cuts in roadways or sidewalks.

- To reduce dust during construction activities, open cuts and exposed areas shall be backfilled and stabilized as soon as each segment of pipe is installed, and at the same time, non-backfill material shall be removed from the site and transported to an appropriate disposal location; any stockpiled material that must remain on-site for more than 24-hours shall be covered with mulch, vegetative covers, or adhesives to capture dust.

- Staked and entrenched straw bales and/or silt fence shall be installed along wetland resource areas to prevent erosion into streams and wetlands.

- Stockpiled soil shall be located away from streams and drainage ways so that runoff cannot carry sediment downstream.

- Work limits shall be designated before the initiation of construction activities and the wetland resource areas shall be clearly marked as off-limits to construction equipment.

8.7.2.1 Construction Dewatering

Construction dewatering from open cuts and trenches shall be routed through appropriately designed sediment basins or traps and discharged through a pipe or lined channel to a stream or other surface water body (under an applicable construction dewatering permit), unless such dewatering can be handled in another manner not requiring discharge to a water body.

8.7.2.2 Equipment Maintenance and Fueling

Maintenance, repair, and fueling of equipment shall be confined to areas specifically designed for that purpose. These areas will have adequate waste disposal receptacles for liquid and solid waste. Waste oil shall be removed to designated waste oil collection areas for recycling. No potential pollutants shall be allowed to drain into catch basins, streams, or other water bodies.

8.7.2.3 Utility Installation

During excavation of utility trenches, the following measures shall be implemented to minimize erosion and protect wetland resources areas:

- Wetland resource areas and buffer zones thereto will be clearly marked as off-limits to construction equipment and materials storage.

- Excavated material from utility trenches shall not be placed between the trench and a wetland resource area. Excavated material shall be placed on the upslope side of the trench to permit any erosion from the material to be captured by the trench.

- Trenches shall be promptly backfilled and stabilized to reduce the risk of erosion.

- Construction debris shall be kept out of stream channels.

8.7.2.4 Grading, Paving and Stabilization

The following measures apply to final grading, paving, and seeding of the project area:

- Permanent soil stabilization with perennial vegetation shall be applied as soon as possible after final grading.

- When using fertilizer to establish areas of new vegetation for soil stabilization, mulches shall be used to prevent fertilizer nutrients from washing off the vegetated areas. Fertilizer shall not be applied if there is likelihood of a significant rainstorm. Fertilizer shall not be applied unless there is adequate protection of surface water, groundwater, and pipeline systems.

- All cuts, fills, and disturbed areas adjacent to paved areas and roadways shall be stabilized with appropriate temporary or permanent vegetation.

- Trenches in roadways and sidewalks shall be repaved with comparable paving material that meets the specifications of the Town of Westminster Department of Public Works.

8.7.3 Operation Phase Mitigation

The general goals of the CWMP are to improve wastewater management for areas exhibiting need, protect and improve the resources within Town, and facilitate the desired land use and development characteristics described in the Westminster Master Plan. Therefore, to meet this goal, the recommendations are intrinsically mitigating as described in both the alternatives analysis chapter and in this chapter of the report. However, many of the recommendations involve construction projects to achieve these goals. These projects include construction or rehabilitation of sewer systems and pump stations, which has the potential to impact nearby resources. The Town will mitigate the impacts of construction through proper engineering design and management. These projects will be designed to minimize impacts to sensitive resources such as surface water, streams, and wetlands. Sufficient setbacks to these resources will be maintained whenever practical, otherwise innovative construction methods that reduce impacts will be considered. The design details and specifications will address mitigation procedures and practices including erosion and sedimentation controls. Appropriate construction management will include administration and observation to ensure the specified mitigation measures are properly implemented. In general, ancillary impacts are expected to be minimal as the vast majority of the proposed projects are targeted for construction within or immediately adjacent to paved rights-of-way. However, to further ensure the mitigation of any possible impacts, the Town will prepare permit applications to any jurisdictional bodies such as the Westminster Conservation Commission or the Massachusetts Historical Commission, during the design phase of all projects. A general permitting outline is provided in the following section.

The recommended plan previously indicated the possibility for minor growth impacts through infilling due to the construction of sewers and also identified the vital need to prevent secondary growth. Although the extent of secondary growth impacts is uncertain at this time, it would likely reduce wastewater capacity reserved for areas of critical need. This occurrence has already been observed in

Town. At the March 2, 2006 Alternatives Workshop, the possibility of limiting sewer connections to within the Wastewater Needs Areas served by the sewer was discussed. This would prevent subsequent sewer extensions constructed by developers to serve new development outside of the needs areas. This requirement could be established through new sewer regulations as detailed in the following subsection.

8.7.4 Future Expansion Mitigation

Based on the limited sewer system capacity and treatment capacity with Fitchburg, growth management and mitigation for future additional expansion of the sewer system is an important issue. To address this issue, the CWMP proposes implementation of a either a Wastewater Management District or a Sewer District By-Law. A management district, created through a special act of legislation, presents two important considerations. The first is the management of the district. Management of a legislated district requires formulation of an administering authority with capacity to take land by eminent domain, issue bonds, assess and collect fees, etc., which must be a separate entity than the municipality itself. The municipal sewer system will be owned and operated by the district. Creating, staffing, and organizing such an entity is a significant effort in its own right. The second consideration is the conservation of sewer capacity, or more simply, limiting connections to existing sewers. A management district clearly defines its service area limits and can only be expanded if so desired by the district itself. The steps to forming a management district typically involve obtaining approving votes from the Board of Selectmen and Town Meeting. After this, a Home Rule Petition must be approved by the Massachusetts Legislature, which is generally a formality at this point.

A Sewer District By-Law can be created and approved through Town Meeting within the Town's existing Home Rule authority. It does not require formulation of a separate management district, but still can be used to limit expansion of the sewer system beyond the approved boundaries. One method for implementing a by-law is through an overlay district of the Town's zoning regulations. An important aspect of this management method is that it would not apply to development that does not fall under the jurisdiction of local regulations, specifically Chapter 40B development.

A third option may be available to the Town. This option also requires a special act of legislation to create the authority to manage the Town's sewer district in accordance with regulations promulgated by the Town (administered through the existing Public Works Commission). This last option has been implemented by the Town of Provincetown, whereby a specific delineated area of the Town ("area of concern" in the Provincetown regulations, analogous to the Town of Westminster's proposed phased sewer areas) is designated for new sewers, and for which criteria are established for future sewer hook-ups.

The district and authority to manage by virtue of this legislation specifically outlines which parcels must hook-up to the new sewers, which parcels may hook-up, and the criteria whereby other parcels may be able to apply for sewer hook-up for new or redeveloped parcels in the future. In all instances, the sewering authority may determine capacity available either in the collection system or treatment plant and accept or deny connection permits on that basis. In all circumstances, the application must come from property owners within the pre-determined "area of need" delineated at the time of the legislative act. Consequently, it offers the community the opportunity to control growth outside of the sewer need area to a great extent, but is more limited in its ability to influence use of capacity within the need area. Much of the hierarchy of need is established at the time of the legislative act; thereafter, capacity is allocated more or less by virtue of "first come - first served."

This latter option may become a serious alternative for the Town; however, this management method has only been implemented (to our knowledge) by communities without existing sewer systems. The language within the Provincetown special legislation gives significant latitude to the sewering authority to

determine capacity and therefore control permit approvals for new sewer connections. The legislation and the district itself are relatively new, and it is not clear whether this authority or the manner in which capacity is calculated will be legally challenged in the future. In addition, the referenced existing model using this management method is not entirely similar, and the initial planning and implementation of the sewer district in Westminster may be more complex. Through this CWMP; however, the Town has developed the requisite level of detail regarding need within the sewered parts of Town, specific developed areas, and future economic growth-designated areas. When considering this alternative, the Town will have to consider that this management option will require a special act of legislation, and changes in existing sewer regulations. Since development within areas currently sewered, or proposed for future sewering may offer connections on the basis of need and date of application, it may not protect the targeted capacity allocations to any greater extent than the more easily implemented sewer overlay district. Further information from legal counsel will be necessary for determination of the eventual manner in which the Town chooses to protect capacity for future and infill development.

The previous narrative provides an overview of management options. S E A previously provided the DPW with an example of a draft Home Rule Petition prepared by a Massachusetts community relative to establishing a Wastewater Management District. The MA-DEP web site provides a comprehensive summary related to development of Management Districts and District By-Laws in Massachusetts. It includes detail on the distinction between the various methods of establishing districts, and the potential benefits and drawbacks of each. This information is located at the following link: http://www.mass.gov/dep/water/wastewater/onsite.htm under the category "Introduction to Management Districts in Massachusetts." After reviewing this information, the Town should have discussions with the MA-DEP and Town Counsel to determine the most appropriate solution and progress with this important step.

A Management District or a district by-law would establish the currently sewered area and the proposed sewer phase areas outlined in this chapter as a Sewer District (Figure 8-1). Any property owner located outside that District wishing to connect to the sewer would apply to the Board of Sewer Commissioners or the District. The permit application would require supporting documentation to establish the need for sewer, including support from the Board of Health. That documentation would be analogous to the information reviewed on a town-wide basis for the wastewater needs and alternatives analyses in the CWMP. Should the Board and District concur with the need for sewer, the applicant would be required to perform capacity mitigation for the volume of wastewater discharged to the sewer system on a basis as determined by the Town (at least a two to one ratio should be considered as the minimum mitigation basis). The mitigation serves to create additional capacity in the sewer system to allow the proposed connection. Mitigation may be provided by the applicant through water conservation and I/I reduction projects. Alternatively, an applicant may elect to pay into a fund administered by the Board or District to complete such projects in Town.

These management methods will act as an effective deterrent to future sewer extensions. The application process will require serious consideration of alternatives to sewer, and a successful application will be subject to considerable mitigation requirements. The cost associated with the application and mitigation will encourage developers to seek on-site wastewater solutions. It is important to note that the recommended plan includes a small number of large parcels in the proposed sewer phases and that the existing sewer area in Town includes some large parcels also. Since these parcels will be included in the Sewer District, the management method must limit growth impacts to the sewer system from these parcels. In-filling within these large parcels has been accounted for within the proposed Sewer District; however, subdivision of these parcels and subsequent sewer extensions to serve parcels that do not have frontage along the sewer should not be allowed. Such controls will be included in the District regulations.

8.8 Regulatory Plan

Based on the evaluation of potential impacts in the previous sections, S E A identified necessary permits for the proposed plan. The most significant permit will be an Expanded ENF with a request for a Single EIR, as determined by MEPA. This Draft CWMP already satisfies many of the documentation requirements of an EIR, and will form the basis for completing a Final EIR and submitting it to MEPA. Other necessary permits will be incorporated into the scope of work for the final design of each phased project. The following permitting plan identifies likely permits and associated tasks that are necessary to gain approval for the Town to proceed with the recommended plan.

1. Prepare an Expanded ENF / Draft CWMP with a request for a Single EIR and submit to MEPA.

2. Prepare a Single EIR / Final CWMP and submit to MEPA.

3. Although not technically a permit, the Town will submit the Draft and Final CWMP to DEP for approval of the plan and to allow application for funding under the SRF program if desired.

4. Prepare a MA-DEP sewer extension permit during final design for each phase of the plan.

5. Prepare an Order of Conditions under the Wetlands Protection Act and the Rivers Protection Act and submit to the Westminster Conservation Commission during final design for each phase of the plan.

6. Review project areas with the Massachusetts Historical Commission during final design to verify that there are no adverse impacts to historical sites.

7. Review project areas with the Natural Heritage and Endangered Species Program during final design to verify that there are no adverse impacts to species habitat.

8. Prepare and submit an Access Permit to the Massachusetts Highway Department for work occurring within state roadway layouts.

Other necessary permits may be identified during the project design phase based on the specific design details.

8.8.1 Interbasin Transfer Act Applicability

The Massachusetts Interbasin Transfer Act (Chapter 658, Acts of 1983 MGL Chapter 21 §§8B-8D) and its regulations (313 CMR 4.00) authorize the Massachusetts Water Resources Commission to review any action to increase the transfer of water between river basins. The ITA specifically exempts transfers between basins within a single town. Westminster contains portions of three river basins. They are the Nashua River Basin, the Chicopee River Basin, and the Millers River Basin, which comprise approximately 80-percent, 12-percent, and 8-percent of the area in Town, respectively.

The origin and destination of water and wastewater in the Westminster municipal water supply and sewer collection systems is complex. Although the recommendations of this CWMP pertaining to the water system and sewer system do not appear to apply to the Interbasin Transfer Act (ITA) by definition when each system is considered individually, the overall result of the recommendations for both systems together may require review under the ITA. Therefore, this section of the Regulatory Plan is provided for review by the Water Resources Commission (WRC) to determine applicability to the ITA. The following

narrative provides background information and details of the recommendations contained in the CWMP regarding the water system and sewer system that will assist the WRC in its determination.

8.8.1.1 Water Supply

Westminster currently obtains all water supply for the municipal water system through an Intermunicipal Agreement (IMA) with the City of Fitchburg (discussed in Chapter 3). The water supply is obtained from the Fitchburg Regional Water Filtration Facility, located in Westminster. Raw water supply for the treatment facility is derived from three surface water reservoirs, which the City owns and maintains. The reservoirs consist of Meetinghouse Pond, Mare Meadow Reservoir, and Bickford Pond. Refer to Figure 1-2, located at the end of Chapter 1. Meetinghouse Pond is located entirely in Westminster, Mare Meadow Reservoir is located mainly in Westminster with a small portion in Hubbardston, and Bickford Pond is located entirely in Hubbardston. Meetinghouse Pond is supplemented by the other two sources. According to the Fitchburg Water Division, the City attempts to limit transfers from the Mare Meadow Reservoir to Meetinghouse Pond. In 2005, approximately 58.5-percent of the raw water delivered to the treatment facility was obtained from the Mare Meadow Reservoir and the remainder was obtained from Meetinghouse Pond. Transfers from Bickford Pond typically occur during drought conditions and did not occur in 2005. Meetinghouse Pond is located in the Nashua River Basin, while Mare Meadow and Bickford Pond are located in the Chicopee River Basin (refer to Figure 1-1). Average daily demand in the municipal water system in 2005 was 0.36 mgd; therefore, it is assumed that 0.15 mgd originated from the source in the Nashua basin and 0.21 mgd originated from the source in the Chicopee basin.

Finished water supply is delivered from the treatment facility to the Westminster Hager Park Pump Station located adjacent to the treatment facility. This pump station provides all supply to the Westminster water system and has a maximum capacity of 1.0 mgd. The water system serves approximately 39-percent of all residences in Town and the balance of the residents in Westminster are served by private wells for water supply. The municipal water distribution system is located entirely within Town boundaries. Approximately 10-percent of the distribution system serves properties in the Millers basin, based on the total number of service connections. The remainder of the distribution system serves properties in the Nashua basin. The distribution system does not extend into the Chicopee basin. Refer to Figure 3-1, located at the end of Chapter 3, for a map of the water system.

The water supply needs analysis in Chapter 5 projects water demand to increase to 0.57 mgd on an average day and to 1.15 mgd on a maximum day by year 2025. The IMA allows Westminster to obtain a maximum daily flow up to 0.87 mgd. The Town can exceed this usage for a total of seven days in a calendar year without triggering requirements to renegotiate for the right to a maximum daily flow up to 1.5 mgd in the future. The needs analysis recognizes that based on projected maximum daily demand, the Town may exceed both the current IMA supply limit and the maximum capacity of the Hager Park Pump Station within the planning period. The CWMP recommends that the Town evaluate its options for increasing water supply and system capacity and determine a schedule for implementation (see Section 8.2.1 of the CWMP).

8.8.1.2 Wastewater Management

Westminster currently discharges all wastewater collected in the municipal sewer system to the City of Fitchburg for treatment and disposal through an IMA with the City (discussed in Chapter 2). The wastewater discharges to the East Fitchburg Wastewater Treatment Facility, located in Fitchburg. This treatment facility discharges treated wastewater to the North Nashua River.

Average daily wastewater flow in the municipal sewer system was estimated in 2005 to be approximately 134,700 gpd, not including I/I. Future wastewater flow from previously sewered areas was estimated in 2005 to be approximately 99,000 gpd, not including I/I and future wastewater flow from current

commitments and planned future extensions was estimated in 2005 to be approximately 64,900 gpd, not including I/I. Infiltration and inflow from current and future sewered areas was estimated in 2005 to be approximately 30,840 gpd. This information is summarized in Table 8.5 in Chapter 8 of the CWMP.

Estimated wastewater flow from the proposed sewer expansion plan under this CWMP (Phases 1 through 5) is estimated to be 199,100 gpd, not including I/I. Infiltration and inflow from the proposed plan is estimated to be approximately 8,960 gpd. This information is summarized in Table 8.5.

Therefore, the estimated wastewater flow from existing areas and from commitments without the CWMP recommendations is approximately 329,440 gpd, including I/I. The estimated wastewater flow from the proposed sewer expansion areas is approximately 208,060 gpd, including I/I. This equates to a total average daily estimated wastewater flow of 537,500 gpd (0.54 mgd), including I/I and a peak hourly wastewater flow of nearly 1,500 gpm.

Wastewater from the municipal sewer system is pumped to Fitchburg by the Whitman River Pump Station. This pump station has a maximum capacity of 500 gpm (0.72 mgd). The wastewater is conveyed into Fitchburg by the Fitchburg Interceptor gravity sewer. The existing sewer system serves approximately 20-percent of all residences in Town and the balance of the residents in Westminster are served by on-site wastewater management systems. The municipal sewer collection system is located entirely within Town boundaries. The sewer collection system serves properties in the Nashua basin and does not extend into other basins. Refer to Figure 2-1, located at the end of Chapter 2, for a map of the sewer system.

The wastewater needs and alternatives analyses (Chapters 4 and 7) identify that expansion of the sewer collection system is the best wastewater management option for several small residential areas in need of improved management and for several defined areas designated for future industrial and affordable housing development (Phases 1 through 5). Chapter 8 identifies that the Whitman River Pump Station and the Fitchburg Interceptor require upgrades to accommodate committed wastewater flow that is pending and flow from the proposed expansion plan (See Section 8.4). The pump station capacity must be increased by a factor of three and a portion of the Fitchburg Interceptor sewer (approximately 3,600 feet) must be increased from 8-inch or 12-inch diameter to 18-inch diameter. The remaining portion of the 9,500 feet of sewer that was investigated in Fitchburg is 18-inch diameter. The latest IMA with Fitchburg indicates that the Town may discharge up to 250,000 gpd of wastewater to the City as measured over a 28-day period. Therefore, the CWMP recommends upgrades for the pump station and interceptor sewer (see Section 8.4.2) and that the IMA be revised to accommodate this plan (see Section 8.4.3). The Town has begun discussing revisions to the IMA with the City.

8.8.1.3 Summary

This information is extracted from various chapters of the CWMP and summarized in this section as it is considered the key details relating to the transfer of water between basins within the Westminster municipal water and sewer systems and serves to facilitate review by the WRC for applicability to the ITA.

For the water system, the CWMP recommends that the Town move to increase available water supply and water system capacity within the twenty-year planning period as determined by need and growth in the Town. There are not any recommendations to expand the water system, and the system is typically extended by developers when it is determined that municipal water supply is required for a particular development. Average daily water demand is projected to increase from 0.36 mgd to 0.56 mgd in the next twenty years.

For the sewer system, the CWMP recommends that the Town extend municipal sewer to eleven small, well defined areas of Town and increase available wastewater disposal limits and collection system capacity. The plan proposes to provide sewer service to approximately 483 developed parcels (481 are residential) and approximately 70 potential parcels (69 are residential). The plan also includes two undeveloped industrial-zoned areas and a municipal parcel designated for planned affordable housing. The goal of this plan is to provide improved wastewater management to portions of Town where Title 5 management of systems is a major concern and a cost burden. Also, the capacity of the existing sewer system must be protected to preserve service for these areas in the future. There are many large, undeveloped parcels near the current and proposed extents of the sewer system; therefore, the plan recommends a management option that prohibits connecting to municipal sewers unless the development is located within the approved sewer district (as recommended in Section 8.7.4). Average daily wastewater flow is estimated to increase from 0.33 mgd (including I/I) for existing flow and current commitments to 0.54 mgd (including I/I) in the next twenty years.

The estimated average daily wastewater flow for the recommended sewer plan is 0.21 mgd (including I/I). It is estimated that approximately 68-percent or 0.14 mgd of this flow is from parcels served by the municipal water system, using the estimates from the CWMP. Based on 2005 data from the Fitchburg Water Division, approximately 58.5-percent of municipal water supply is obtained from the Chicopee River Basin and the remainder is obtained from the Nashua River Basin; therefore, it is assumed that the plan will transfer 0.08 mgd from the Chicopee basin into the Nashua basin through the proposed sewer system and subsequent treatment in Fitchburg. It should be noted that approximately 0.09 mgd of the estimated 0.14 mgd of flow from parcels served by municipal water under this plan is from an undeveloped industrial area and a municipal parcel planned for affordable housing. This flow was estimated conservatively because of the uncertainty of future development.

8.9 Financing Plan

The recommended plan includes several phases, each entailing initial capital costs. Following review and acceptance of the Draft CWMP, S E A will continue to work with Town officials to formulate specific capital and continuing financial implementation mechanisms for each of the plan's components. This section outlines the preliminary approaches considered for initiating those discussions.

8.9.1 Background

In the Commonwealth of Massachusetts, municipalities are granted a certain degree of latitude in the execution of capital projects and the management of infrastructure systems. Within statewide guidelines, towns may adopt local by-laws and develop regulations that govern how the capital costs of infrastructure construction projects are recovered, and how private parties may use those systems. Construction of new infrastructure often happens in response to the actions or needs of private parties. In those cases, those private parties, often corporations, will directly or indirectly fund a significant share of the infrastructure capital costs. However, even when those singular contributions are arranged, municipalities must fund the remainder of the capital costs through other mechanisms.

Municipalities can recuperate all or portions of their costs of constructing public works projects, such as sewers, through the assessment of betterments against the properties that directly benefit from the project. The betterment is typically in the form of a lien held by the municipality against the bettered property. The property owner can typically elect to finance payments over time. Property owners that meet minimum criteria, such as elderly individuals on fixed income, can defer payment of betterments until the property ownership is transferred. Massachusetts General Laws establish the limits of what costs can and cannot be recovered through betterments and set similar limits on how the betterments may be established. Individual municipalities must adopt specific betterment assessment strategies within those limitations for their public works projects. Betterments may be apportioned based simply on lot geometry

such as frontage length or area, or based on estimated use of the utility requiring water and sewer use projections based on land use and area. Historically, the Town of Westminster has financed sewer infrastructure capital costs through betterments and has based assessments on lot frontage and area.

A second mechanism for recuperating capitals costs of constructing infrastructure is through increases in the general tax rate. Whereas betterments are assessed only to properties directly gaining access to the new infrastructure, general tax increases are assessed to all properties within the municipality and are proportional to each property's assessed value. Municipalities can and have financed infrastructure projects exclusively through betterments or through general tax increases; however, municipalities typically divide the cost between the two mechanisms based on the precept that properties with direct connections to the infrastructure gain clear, significant benefit from the project and the municipality as a whole gains an ancillary benefit by the nature of the improved systems.

Another mechanism for funding certain infrastructure projects is through new connection fees. This approach is useful for funding expansion of existing facilities to accommodate growth of the system. Although this approach fairly apportions expansion costs to those gaining benefit from the municipal systems, connection fees obviously can only be collected at the time of connection whereas betterments and general tax increases are assessed upon completion of the improvement project. Therefore, funding projects through connection fees require some short-term financing by the municipality, department, or commission owning the system. The Town of Westminster currently assesses sewer system connection fees based on connection type (i.e. residential or commercial/industrial).

Finally, small infrastructure projects may be funded through the sewer department's operating budget and recovered through usual user fees collected from sewer bills. Similarly, continuing operation, maintenance, and administration costs are primarily funded through user fees collected from sewer bills.

8.9.2 Wastewater Management Projects

S E A provided opinions of probable project cost for complete design, construction, administration, and contingency as follows: Phase A is $3.27 million, Phase 1 is $4.02 million, Phase 2 is $2.65 million, Phase 3 is $2.42 million, and Phase 4 is $2.23 million for a total of $14.59 million. The recommended plan currently includes roughly 2,000 properties not served by the existing or proposed sewer systems, making this plan a typical example of a project for which betterments are applied. Likewise, as the focus of Phases 1 through 3 includes protection of drinking water and recreational surface waters, many of these extensions benefit the Town as a whole, and not just the property owners receiving sewer services; therefore, the plan is also representative of projects for which general tax rate increases are enacted. The City of Fitchburg fees for treatment and disposal and costs for maintaining the collection system will be analogous to current costs and will continue to be passed on to sewer customers through sewer bills. The Sewer Department and Commission will monitor these costs and adjust sewer rates if appropriate.

S E A prepared estimates of sewer construction cost per household during the alternatives analysis phase to assist in screening the cost of the regional (sewer) alternative versus the cost of other alternatives. These estimates have been revised using the latest conceptual design information. The estimated cost for the recommended plan Phases 1 though 3, based on the opinions of probable construction cost provided in Section 8.3, is approximately $19,000 per household. This does not include connection fees and the cost to install individual house services. The estimated cost for Phase 4 is approximately $30,000 per user. These estimates include future users based on frontage and parcel size. As revealed in the alternatives analysis, the cost to sewer the Phase 1 through 3 areas is favorable on a per user basis compared with the cost for a Title 5 system. The Phase 4 per user cost is much higher because the density of the area is less than Phases 1 through 3. Phase 4 consists of the Bacon Street Area, which is a challenging area for constructing sewer and the overall cost is high. Based on 2005 Westminster water/sewer rates, annual

sewer user fees for a residential user can be between $300 and $500. Commercial and industrial user fees can be much higher depending on water use.

In the past, the Town has assisted with financing sewer construction by paying for a portion of the construction and assessing betterments for the remainder. Based on the assumption that the Town could finance 50-percent of the sewer expansion construction cost and utilize betterment assessments for the remaining portion, the average betterment would be approximately $10,200 per user for Phases 1 through 4, based on the opinions of probable cost and not including connection fees and the cost to install individual sewer services. The cost to the Town would be approximately $5.66 million, not including the Phase A improvements. It is recommended that the Town carefully consider its historical financing method and the amount of financing that it can commit to based on the magnitude of the opinions of probable cost for the entire plan.

8.9.3 Potential Funding Assistance

8.9.3.1 Municipal Sewer Construction

8.9.3.1.1 State Revolving Fund (SRF) Program

The primary means through which Massachusetts communities obtain assistance in funding major wastewater infrastructure projects is the State Revolving Fund (SRF) program. The SRF program for water pollution abatement projects is jointly administered by the Division of Municipal Services of MA-DEP and the Massachusetts Water Pollution Abatement Trust. Procuring funding for projects requires an application process in a competitive system. The state prioritizes funding for projects through a point system that addresses environmental, programmatic, and implementation criteria. Funding is provided via subsidized loans (at 2-percent interest as of 2006). In recent years, the program has operated with $300 to $350 million per year. This equates to about 50 – 70 projects annually.

Funding under the Clean Water SRF (there is a Drinking Water program as well) is intended to address planning and construction of new wastewater treatment facilities and upgrades of existing facilities, infiltration/inflow correction, wastewater collection systems, and non-point source pollution abatement projects, such as landfill capping, community programs for upgrading individual subsurface disposal systems (Title 5), and other similar projects.

The process starts with completion of a Project Evaluation Form (PEF). These forms are typically required by August of each year. The PEF becomes the basis for the MA-DEP's scoring or ranking of the project. All projects are scored and MA-DEP publishes a list of projects eligible to receive financial assistance. If projects are ready to proceed, the projects become part of the Intended Use Plan project listing (IUP). These projects may then be funded in the next year. To qualify for placement on the IUP, a project must have a high enough ranking, have received a local funding appropriation, or be scheduled for funding appropriation by June 30th of the coming year. The loan application is due no later than October 15th of that year. The phases of construction recommended within the CWMP may be submitted as separate fundable projects based on Westminster's anticipated implementation schedule.

Funding for this Comprehensive Wastewater Management Plan (CWMP) was obtained through the SRF program. Since MA-DEP encourages communities to undergo this kind of comprehensive planning, planning projects such as this are almost always funded. Construction projects, on the other hand, are much more competitive and project points generated on the basis of findings from this CWMP will allow Westminster's PEF to achieve a higher score than would have been possible prior to this study. Nonetheless, funding is not guaranteed and occasionally multiple submittals are required prior to obtaining SRF funding.

Recommendations under this plan encompass Tier I/Tier 2, Collection Systems, and Non-Point Source areas of the SRF program. For capital projects, such as pump station upgrades and collection system construction, the SRF program requires development of plans and specifications prior to application for funds. Therefore, the schedule for application for funding and implementation of recommended improvements should be carefully coordinated to ensure that if the projects are determined to be fundable (i.e. are listed on the Intended Use Plan), the Town is prepared to move forward with the application with a completed design. Costs for design of the improvements are not eligible under the SRF program. The Town is also aware that by proposing grinder pumps, it must meet the ownership and maintenance requirements of the SRF program to qualify for funding assistance.

8.9.3.1.2 USDA Rural Development Loan/Grant Program

The United States Department of Agriculture (USDA) Rural Development loan/grant program is available to rural communities and small-incorporated towns/cities not larger than 10,000 inhabitants (1990 Census) to develop water, sewer, storm water, and solid waste disposal facilities. To qualify for grant funding, the median household income (MHI) of the community must be less than the state non-metro MHI. Westminster does not qualify for grant funding, but the Town is eligible for loan funding.

The program allows loan funding with a maximum repayment period of 40-years; however, the community may pay the loan in advance with no penalty. According to the USDA Central Massachusetts office, communities receiving loans are not required to have a prospectus performed and incur a smaller expense charge from their bonding company. This has been shown to save communities up to $15,000. The available loan rate as of August 2006 is 4.5-percent. The USDA loan application and administration process is generally considered less intensive and time consuming than the SRF process.

8.9.3.2 Town-Wide Septic Management

One of the recommendations of the CWMP includes a town-administered on-site wastewater management plan. The Non-Point Source aspect of the SRF program has a specific program – the Community Septic Management Program (CSMP) – to assist homeowners with repair or replacement of failed septic systems. The program is essentially a town-administered revolving fund whereby the Town applies for and administers the state funds. Individual homeowners can apply for low-interest loans over a payment period to be established by the community (although not longer than 20-years). The loans are essentially the equivalent of a betterment assessed to sewered properties, as described in the previous section. As detailed on the MA-DEP website, the program provides a loan to the community at an effective zero percent interest rate. The community then typically re-loans the money at 5-percent to homeowners to cover costs of administration. The community also has an option to set aside up to 2.5-percent of the loan funds to obtain consulting services to administer the program. There is also a $20,000 grant available for first-time communities entering the program to provide additional funds to assist with administrative costs.

In order to qualify for the loan (up to $200,000) and the grant ($20,000), Westminster would be required to implement either a Community Inspection Plan or a Local Septic Management Plan, as described in the CSMP Planning Guidance Manual. These plans embody the concepts described in the recommendations of this CWMP.

8.10 Implementation Plan

The Implementation Plan is provided to assist the Town in carrying out the recommendations of the CWMP by summarizing key necessary tasks. These tasks include strategies to mitigate construction impacts, sewer system upgrades to allow pending sewer connections and the plan phases, the costs and methods of financing the construction, and the activities required at Town Meeting to gain approval. This

implementation plan should not be considered a complete catalog of the tasks necessary to execute each recommendation, as unexpected activities, permits, and costs often surface during complex construction projects. However, it should serve as a reasonable guide for the Town to assess the complexity, probable cost, and approximate schedule for implementation.

Table 8.7 summarizes the major components of the recommended plan for implementation by the Town. First, S E A recommends that the Town begin immediately with developing an appropriate administrative management option for the existing and proposed sewer district to prevent growth from impacting the available capacity of the municipal sewer system. After this has been implemented, the Town can eliminate the current sewer connection moratorium. The Town should also proceed immediately with the Phase A municipal sewer system capacity improvements to allow future sewer connections and the proposed phased sewer plan to occur. These tasks/projects should be complete by the year 2010, or prior to completion of the Phase 1 sewer expansion project.

The Phase 1 through 4 sewer expansion projects should be implemented by the Town based on the timeframe provided in Table 8.7. Phase 5 does not require significant Town action for implementation.

The Westminster Board of Health should begin evaluating options for an On-Site Wastewater Management Plan and consider temporary implementation of a voluntary septage management plan. By 2008, the Board of Health should identify a preferred management plan and a schedule for implementation.

Table 8.7
Implementation Plan

Recommendation		Approval / Town Meeting Appropriation	Completion Year
Administrative Options	Sewer Management Method (Management District / Sewer District By-Law)	2007	N/A
	On-Site Wastewater Management Plan	2008	N/A
Phase A Improvements		2007	2009
Phase 1 Sewer – 20,000 l.f. of sewer main and 212 current and potential lots.		2008	2010
Phase 2 Sewer - 13,400 l.f. of sewer main and 148 current and potential lots.		2010	2012
Phase 3 Sewer - 13,000 l.f. of sewer main and 120 current and potential lots.		2014	2016
Phase 4 Sewer - 6,200 l.f. of sewer main and 73 current and potential lots.		2018	2020
Phase 5 Sewer – Municipal Housing Parcel and Undeveloped, Industrial-Zoned Land.		N/A	Uncertain

N/A – Not Applicable

8.10.1 Town Meeting Preparation

This CWMP was developed in conjunction with a diverse Citizens Advisory Committee (CAC) representing various stakeholders and interests in Westminster. An important theme for the CAC is achieving the goal of obtaining Town Meeting funding support for the CWMP recommendations. It is common that comprehensive plans gain regulatory approval but fail to obtain Town Meeting funding, thereby resulting in no action and continued use of inadequate management systems.

S E A is confident in the methodology and conclusions of the report and through CAC meetings and public workshops, the recommendations appear generally aligned with the sentiments of the voting public in Westminster. However, in order to reach a broader audience, the Town will hold a public meeting to present the conclusions of the Draft CWMP and recommended plan and to solicit input that was not acquired at any of the public CAC meetings and workshops. Following receipt of public input, S E A will prepare a Final CWMP and a final implementation plan, including scheduling specific Town Meeting articles.

8.11 Final CWMP Preparation

Following the submission of this Expanded ENF / Draft CWMP to MEPA, S E A will address comments received and prepare a Single EIR / Final CWMP. S E A will submit the Final CWMP to MEPA and MA-DEP for formal review.

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Alicia Altieri	Preston Baker	William Wintturi

Appendix A
Municipal Wastewater System Capacity Analysis

Appendix B
Subsurface Investigation Data

Appendix C
Wastewater Needs Analysis Worksheet

Appendix D
Wastewater Alternatives Analysis Worksheets

Appendix E
Proposed Sewer System Conceptual Designs