TOWN OF LUNENBURG, MASSACHUSETTS

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

Phase I

Existing Conditions, Future Requirements and Problem Identification/ Needs Assessment

April 2007

Wright-Pierce
Civil and Environmental Engineering Services

TOWN OF LUNENBURG

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

EXISTING CONDITIONS, FUTURE REQUIREMENTS AND PROBLEM IDENTIFICATION/ NEEDS ASSESSMENT

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EXECUTIVE SUMMARY

This report, entitled "Comprehensive Wastewater Management Plan, Phase I – Existing Conditions, Future Requirements and Problem Identification/Needs Assessment," presents the results of the first phase of a multi-phase study undertaken by the Town of Lunenburg to determine the viability of current wastewater disposal practices in satisfying existing and projected future wastewater disposal needs, through the year 2026. A comprehensive evaluation will be made of alternative solutions to address issues with conventional on-site wastewater disposal systems serving specific areas of Town. Specific recommendations will take into account the appropriateness of utilizing septage management plans, stormwater management plans, nutrient management plans, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal. A final recommended plan will be developed through the Comprehensive Wastewater Management Planning (CWMP) process to address the identified wastewater disposal options of designated need.

This document is Phase I of the four phase CWMP process regulated by DEP's *Guide to Comprehensive Wastewater Planning* (1996). The four phases are:

Phase I:	Assessment of existing conditions, projection of future wastewater disposal requirements, and a needs assessment for the Town. The needs assessment will determine areas with need for further study in Phase II;
Phase II:	Identify and short-list appropriate means of handling the wastewater management methods to address the areas identified in Phase I. The analysis will include a review of technical, environmental, institutional and economic factors;
Phase III:	Detailed evaluation of alternatives identified and short-listed in Phase II, and a recommendation of a specific wastewater management plan for each area; and
Phase IV:	Finalize specific wastewater management plan for each area.

In addition to evaluating future wastewater treatment and infrastructure needs within the presently sewered areas, the Phase I document provides a comprehensive look at the Town's wastewater disposal needs by including reviews of the previous studies along with a "fresh look" at the Town's needs as a whole.

The assessment was performed to review whether or not conventional on-site Title 5 septic systems can provide adequate means of providing for sanitation, environmental protection and growth management within Town today and through the 20 year planning period. For the purposes of this report, wastewater management needs have been evaluated in the following 5 categories:

- **Public Health**--correction or avoidance of unsanitary conditions such as effluent surfacing over a leaching field, inadequate set-back from a private well, or direct discharge of sanitary wastewater to a watercourse.

- **Water Supply Protection--**preventing contaminants (such as bacteria, viruses or nutrients) from reaching private or public drinking water sources.

- **Protection of Surface Waters--**such as reducing nutrients that can cause accelerated degradation of freshwater ponds (typically phosphorus).

- **Preserving Community Character--** highlighting areas of sensitivity particularly in regards to potential impacts of wastewater alternatives. Sensitive areas that were included in the assessment were ACECs, Priority/Estimated Habitat Areas, Open Space/Protected Lands, and the Historic District.

- **Managed Growth--**providing wastewater treatment and disposal so that conventional Title 5 system conditions (such as impermeable soils or shallow groundwater) are not the limiting factors to managed growth and development. The Town is working on planning and regulations for managed growth.

REASONS FOR STUDY

The Town of Lunenburg has been involved in the wastewater planning process in various forms since the early 1970s and has just recently extended sewers throughout certain areas of Town. The Town determined a review was necessary due to three major factors: 1) a concern for the number of traditional on-site subsurface wastewater disposal systems which were unable to comply with Title 5 regulations and the health risks associated with those failures; 2) population growth concerns; and 3) the limited capacity for sending wastewater to nearby municipal facilities for treatment and disposal.

The Town of Lunenburg has seen a significant number of compliance difficulties for on-site wastewater disposal systems since the implementation of the revised Title 5 regulations on March 31, 1995. Many of the systems in Town were constructed prior to the adoption of the 1978 Title 5 environmental code and have exceeded their design life expectancy.

SUMMARY OF ANALYSIS

Phase I of the CWMP began by collecting and analyzing existing Town specific data. The most critical data collected and analyzed as part of Phase I was obtained from Lunenburg Board of Health records, Lunenburg Assessors data, Lunenburg Conservation Commission composite figures, the Natural Resources Conservation Service (NRCS), and the Massachusetts Geographical Information System (MassGIS).

The town of Lunenburg was subdivided into study areas based on a number of qualifying factors. Watershed sub-basins, zoning, lot size and geographic location were the major determining factors in establishing the study areas. All conservation, municipal, federal and state lands were delineated and excluded from the areas of study. In addition, properties that are currently connected to the sewer and properties that were bettered for sewer connection were also removed from the assessment.

The needs assessment rating methodology focused on avoiding sanitary problems, protecting the Town's drinking water supply, preserving surface waters, maintaining community character, and managing impacts from growth. Each of these goals was evaluated utilizing a two-tiered approach. A ranking formula was created to establish or eliminate areas for further evaluation of the need for further study of alternative wastewater treatment and disposal (Tier 1). Then, each potential area of further study was evaluated based on BOH files from selected systems from each area, a visual analysis of specific areas within Town, and the potential for further development (Tier 2).

RESULTS AND FINDINGS

The needs assessment identified the suitability of properties for continued, long-term reliance on conventional on-site wastewater disposal systems. The needs assessment provides an overview of areas that:

- Are well suited for conventional on-site wastewater disposal systems for long-term wastewater management,
- Will be further studied for continued reliance on conventional on-site septic systems for long-term wastewater management, or
- Will be reviewed for potential growth management of industrial and commercial development.

There are 15 study areas in Town which are well suited for the continued use of on-site systems. Some of these areas showed small portions of needs and the BOH should consider creating a septage management plan which would take into consideration minor areas of need.

The Tier 1 and Tier 2 analyses determined that the Town has 11 areas with need for further study, or "needs areas". This final grouping establishes a baseline for the Areas to be considered in CWMP Phase II Management Techniques and Alternatives Identification and Screening. Wastewater options for each area that will be investigated include utilizing septage management plans, stormwater management plans, nutrient management plans, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal. The needs areas are listed in Table ES-1.

TABLE ES-1
AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name
4	Lower Mass Ave
6	Baker Station
9	Lake Whalom
10	Mass Ave. / Beal Street
12	Highland Street
14	Hickory Hills Lake
15	Rolling Acres Road
19	Lake Shirley
24	Squannacook
25	Pioneer GMD*
26	Chase GMD*

* Growth Management District (Industrial/Commercial)

Existing and future wastewater flow estimates were estimated for the needs areas. The wastewater flows were calculated so that there are flow estimates to utilize during the CWMP Phase II Management Techniques and Alternatives Identification and Screening. The quantity of wastewater flow is an important factor in evaluating the wastewater management alternatives. The needs area wastewater flow estimate calculations are included in Table ES-2.

TABLE ES-2
WASTEWATER FLOW ESTIMATES -
NEEDS AREAS AND SEWERED AREAS FOR CWMP PHASE II

Needs Areas		Estimated Existing Sanitary Flow 2006 (gpd)	Estimated Future Sanitary Flow 2026 (gpd)	Estimated Future I/I Flow 2026 (gpd)	Total Future Estimated Flow 2026[1]
4	Lower Mass Ave	24,900	26,500	19,900	46,400
6	Baker Station	36,500	39,600	29,700	69,300
9	Lake Whalom	34,600	37,200	27,900	65,100
10	Mass Ave. / Beal Street	20,600	23,400	17,600	41,000
12	Highland Street	13,900	14,900	11,200	26,100
14	Hickory Hills Lake	73,300	79,400	59,600	139,000
15	Rolling Acres Road	16,200	17,600	13,200	30,800
19	Lake Shirley	76,600	81,800	61,400	143,200
24	Squannacook	1,600	1,800	1,400	3,200
25	Pioneer GMD	5,000	40,000[2]	30,000	70,000
26	Chase GMD	5,800	48,400[2]	36,300	84,700
	Total Estimated Study Area Flow	**309,000**	**411,000**	**308,000**	**719,000**
	Sewered Areas Presently Connected	93,000	400,000	103,000	503,000
	Sewered Areas Presently Unconnected	89,000	* Included above	N/A	N/A
	Proposed Developments in Sewered Areas	120,000	* Included above	N/A	N/A
	TOTAL Estimated for Phase II Alternatives Analysis	**611,000**	**811,000**	**411,000**	**1,222,100**

1 Total future flow is the sum of the estimated future sanitary flow and the estimated future I/I flow.

2 For Growth Management Districts, Year 2026 is flow not based on flow projections, but instead on the theoretical buildout flow. The Town wishes to see these areas developed to their full potential within the study period.

RECOMMENDATIONS

Based upon the results and findings of the Phase I CWMP, the Town will now proceed with Phase II of the CWMP to identify alternatives to address wastewater treatment, collection and disposal for the areas with need for further study, or "Needs Areas", listed above. The CWMP Phase II - Management Techniques and Alternatives Identification and Screening will present draft recommendations for wastewater management in the identified needs areas of Lunenburg where on-site conventional Title 5 septic systems may not provide adequate wastewater treatment. Specific recommendations by study area will take into account the appropriateness of utilizing septage management plans, stormwater management plans, nutrient management plans, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal. The CWMP Phase II will evaluate the environmental impacts and design criteria associated with each alternative and recommend the appropriate long-term solution to the wastewater disposal problems in each needs area.

SECTION 1

INTRODUCTION

1.1 PURPOSE/BACKGROUND INFORMATION

The town of Lunenburg, Massachusetts is a suburban community located in Worcester County approximately 43 miles northwest of Boston, MA and 27 miles north of the city of Worcester, MA. The Town is approximately 28 square miles in size bordered on the west by the city of Fitchburg and the town of Ashby; on the south by the city of Leominster and the town of Lancaster; on the east by the town of Shirley and on the north by the town of Townsend. Refer to Figure 1-1 for an aerial view of Lunenburg and the surrounding communities. Two numbered state highways, Route 13 (Electric Avenue and Chase Road) and Route 2A (Massachusetts Avenue), serve the Town with access to and from surrounding communities.

In July 2006, the Town of Lunenburg retained Wright-Pierce to prepare a Comprehensive Wastewater Management Plan (CWMP). The Town is continuing their efforts to address the wastewater disposal needs of Lunenburg due to concerns about health risks and growth issues. The CWMP[1] will address current and future wastewater needs, wastewater management alternatives, and determine a final plan through careful comparison and evaluation of alternatives. Although there are some areas which are served by connections to adjacent communities' municipal wastewater collection systems, the Town primarily relies on on-site wastewater disposal systems for wastewater treatment and disposal. The Single Environmental Impact Report filed in December 2001 stated that many of these systems are older, located in poor soil conditions and are considered substandard under the Commonwealth's Title 5 regulations.

The Town of Lunenburg is working to improve the current wastewater treatment and disposal options in Town and is reviewing the need for alternative and improved wastewater disposal systems. Wastewater treatment and disposal options include utilizing the wastewater

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[1] Acronym. All acronyms are defined in Appendix A.

Source:

Data obtained from the Town of Lunenburg and MassGIS.

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

2005 Aerial Ortho Images

PROJ NO.	10849B
DATE:	Dec 2006
SCALE:	AS NOTED

Wright-Pierce
Civil and Environmental Engineering Services

FIGURE:
1-1

infrastructure in the towns of Leominster and Fitchburg. On March 11, 1994, the Town's Wastewater Commissioners signed an Intermunicipal Agreement (IMA) with the City of Fitchburg. This IMA allowed Lunenburg to convey up to 500,000 gpd of wastewater to Fitchburg for treatment and disposal at the Fitchburg East Wastewater Treatment Facility. The duration of the IMA was set at twenty years. However, a clause was written into the IMA which would reduce the amount of wastewater allowed under the agreement. This "capacity not utilized" clause revised the amount of the IMA from 500,000 gpd to an amount equal to the average daily flow in the maximum month in Years 8, 9, and 10 of the agreement, plus 40,000 gpd. According to the Fitchburg DPW, the "capacity not utilized" clause reduced the IMA allowed flow to 80,000 gpd. If capacity beyond this 80,000 gpd limit is required, the IMA would need to be renegotiated with the city of Fitchburg. A copy of this IM is included in Appendix I.

On June 22, 1999, the Lunenburg Wastewater Commissioners signed an IMA with the City of Leominster. The IMA with Leominster is similar to the IMA between Lunenburg and Fitchburg, with slight differences in the various rates charged to the Town, and the absence of a mechanism to reduce the amount of allowable flow.

In the spring of 2001, the construction of Phase I sewers began as recommended by the approved Lunenburg Wastewater Facilities Plan (June 1999). The Phase I sewer construction connected new sewers serving the Town Center and Whalom areas to the existing 60-year sewer connection into Leominster. Currently, with the completion of Phase I sewers, construction of the later phases ("Phase II") has been postponed pending further study and investigation of the Town's wastewater management needs.

1.2 REVIEW OF PRIOR PLANNING EFFORTS

The Town of Lunenburg has been involved in the wastewater planning process in various forms since the early 1970s. The Town determined a review was necessary due to three major factors: 1) the increasing number of traditional on-site subsurface wastewater disposal systems which were unable to comply with Title 5 regulations and the health risks associated with those failures; 2) population growth concerns; and 3) the limited capacity for sending wastewater to nearby municipal facilities for treatment and disposal.

In 1973, Morgenroth & Associates produced a Wastewater Facilities Plan for Lunenburg. The report identified several areas of need and recommended the construction of a comprehensive network of gravity sewers and pumping stations with discharge to Fitchburg and Leominster. The community did not approve or support this plan of Town-wide sewers fearing it would lead to unwanted over development of the Town.

In 1982, Dufresne-Henry prepared a draft Facilities Planning Report for the Town. This draft report recommended a communal-type leachfield and septic system for the Town Center area in addition to several gravity sewer collection networks in the southwest area of Town. The communal-type leachfield and septic system was never accepted by the Massachusetts Department of Environmental Protection (MADEP) and therefore the report was never finalized. The MADEP concluded that the area's soil characteristics were not ideal for the proposed solution, and that it could potentially have an adverse effect on down-gradient drinking wells in much of the area surrounding Hickory Hills Lake. The MADEP suggested the investigation into wastewater being transported to the nearby Leominster or Fitchburg collection systems and treatment facilities via gravity sewers and force mains. No work was performed to address these concerns and the project's grant was closed-out on July 14, 1985.

In 1989, the Lunenburg Planning Board formed an ad hoc Sewer Feasibility Study Committee to review all previous studies and to evaluate the Town's wastewater management needs. The Committee recognized the main problem areas in Town consistently were the Town Center and the Whalom area. They recommended that a comprehensive sewage disposal plan should be developed. The Committee concluded that the construction of a sewer collection system would be necessary for a long-term solution, and that the more appropriate location for the treatment and disposal would be at the Fitchburg East Wastewater Treatment Facility. On March 11, 1994, the Town's Wastewater Commissioners signed an Intermunicipal Agreement (IMA) with the City of Fitchburg.

In 1995, Thomas Planning Services, Inc. prepared a Sewer Impact Study of the southwest section of the town of Lunenburg. The study was completed to address the anticipated growth following the construction of sewers in the area. The study concluded that the Town could mitigate adverse impacts of sewers by leaving the current single family residential lot size unchanged to maintain the desired character of the Town.

In 1998, the Town contracted Universal Engineering Corp. to address the aforementioned wastewater management issues. In June 1999, Lunenburg approved Universal's Lunenburg Wastewater Facilities Plan, which was a 20-year planning document to guide the Town of Lunenburg in meeting wastewater management needs. It recommended the phased construction of over 30 miles of sewers, eight pumping stations and appurtenances over the 20 year planning period. On June 22, 1999, the Lunenburg Wastewater Commissioners signed an IMA with the City of Leominster and the construction of Phase I sewers began in December 2001.

In February, 2000 on behalf of the Town, Universal Engineering Corp. filed an Environmental Notification Form (ENF) with a Phase I Waiver with the Massachusetts Environmental Protection Act (MEPA) Unit. The ENF was filed because the planned sewer construction of over 30 miles exceeded the review threshold of 10 miles as laid out by MEPA 301 CMR 11.03 (5) (a). MEPA issued the Town a certificate on May 26, 2000 which allowed for the Phase I waiver, but required the preparation of an Environmental Impact Report (EIR).

The Town retained Guertin Elkerton & Associates (formerly Universal Engineering Corp.) to produce a Single EIR and Comprehensive Wastewater Management Plan (SEIR/CWMP) for the Lunenburg Wastewater Facilities Plan in December, 2001. This document was subsequently approved by the MADEP and the Massachusetts Executive Office of Environmental Affairs (EOEA)[2] and a certificate on the project was issued on March 18, 2002. Lunenburg filed the ENF and SEIR/CWMP to comply with the MEPA and DEP requirements, so that construction could proceed on the phased plan. The SEIR/CWMP concluded that there would be negligible

[2] Glossary. All glossary terms are included in Appendix B.

impact to the volume of net water exported from the basin due to the proposed sewers. The Final MEPA certificate is included in Appendix C.

Following the approval of the SEIR/CWMP, S E A Consultants Inc. was retained by the Town in June 2005 for interim wastewater management planning which continued through October 2005. The construction of the Phase I sewers opened up several previously unbuildable lots and tracts of land to development and this caused the Town to be concerned about the growth impacts that were developing. The construction of Phase I sewers were completed in June 2006. Further construction of Phase II has been postponed so that Lunenburg could further investigate and study the Town's wastewater management needs.

Wright-Pierce was retained in July 2006 to review all previous work and perform additional comprehensive wastewater management planning for the entire Town. The scope for this revised CWMP is included in Appendix D. This document is Phase I of the four phase CWMP process prescribed by DEP's *Guide to Comprehensive Wastewater Planning.* The four phases are:

Phase I:	Assessment of existing conditions, projection of future wastewater disposal requirements, and a needs assessment for the Town. The needs assessment will determine areas with need for further study in Phase II;
Phase II:	Identify and short-list appropriate means of handling the wastewater management methods to address the areas identified in Phase I. The analysis will include a review of technical, environmental, institutional and economic factors;
Phase III:	Detailed evaluation of alternatives identified and short-listed in Phase II, and a recommendation of a specific wastewater management plan for each area; and
Phase IV:	Finalize specific wastewater management plan for each area.

This Phase I document provides a comprehensive look at the Town's wastewater management needs by including reviews of the previous studies along with a "fresh look" at the Town as a whole.

The intent of this phased approach is to arrange the project tasks into groups with increased complexity, relying upon information gathered in previous phases. At the conclusion of each phase the scope of work for the next phase will be evaluated to determine if it still applies and to what extent, if any, modification is needed.

1.3 STAKEHOLDERS

The Town of Lunenburg and Wright-Pierce consider the involvement of the citizens and interested stakeholders of Lunenburg as one of the highest priorities in developing the CWMP. Wright-Pierce assisted the Town with incorporating the involvement of the many varied stakeholders. The Project Stakeholders include the Lunenburg Board of Selectmen, Sewer Commission, Board of Health, Conservation Commission, and Planning Board; Lake Shirley Association and Hickory Hills Lake Association; citizen's of Lunenburg; MADEP, Department of Fish and Wildlife (DFW) Natural Heritage Program, Water Resources Commission (WRC), and the Executive Office of Environmental Affairs (EOEA) Massachusetts Environmental Policy Act (MEPA) Office; the Nashua River Watershed Association (NRWA), Montachusset Regional Planning Commission (MRPC), and officials from neighboring communities. Input from each of these stakeholders was considered in the development of this report. The stakeholders were involved in several different aspects of this report through telephone conversations, direct meetings, board meetings, and public meetings.

1.4 REGULATORY REQUIREMENTS

This CWMP for the Town of Lunenburg has been prepared in compliance with several regulations, and guidelines. Those considered include:

- *MA DEP* Guide to Comprehensive Wastewater Management Planning, *published in January 1996.*

  This CWMP is being prepared in accordance to the guidelines provided by the DEP to assure compliance with the structure and substance of the report.

- *Massachusetts Environmental Policy Act (MEPA), 301 CMR 11.00, revised in 1998.*

  This CWMP is being prepared in accordance with "the MEPA regulations, (301 CMR 11.00), which establish thresholds, procedures and a timetable for public review of the environmental impacts of activities funded or permitted by state agencies." (DEP Guide to CWMP January, 1996) The Town's previously approved Environmental Notification Form (ENF) and Environmental Impact Report (EIR) will be utilized throughout the process. The intent is to file a new ENF as part of planning.

- *Intermunicipal Agreements with Fitchburg and Leominster*.

  With Lunenburg's existing Phase I collection system, wastewater is treated by municipal Wastewater Treatment Facilities (WWTFs) in Fitchburg and Leominster. The Town entered into contractual IMAs with Fitchburg and Leominster issued on March 11, 1994 and June 22, 1999 respectively.

1.5 MASSACHUSETTS STATE REVOLVING FUND LOAN PROGRAM (SRF); CHAPTER 21 AND 29C MASSACHUSETTS GENERAL LAW (MGL)

The Massachusetts State Revolving Fund Program allows the state to offer low interest loans to communities to subsidize wastewater projects, including comprehensive wastewater management planning. In August 2006, Wright-Pierce, in conjunction with the Town of Lunenburg, applied for SRF funding in the amount of $207,930 for the preparation of Phase I and Phase II of a Comprehensive Wastewater Management Plan for the Town. The application was subsequently approved in September 2006, permitting the CWMP process to proceed as planned. This loan was pursuant to Chapter 21 and 29C MGL. Regulations governing and defining project eligibility, performance criteria, evaluation criteria, affirmative action and minority-owned business enterprise (MBE)/woman-owned business enterprise (WBE) requirements and the terms and conditions of the loan agreements are covered in 310 Code of Massachusetts Regulations (CMR) 44.00.

SECTION 2

EXISTING AND FUTURE CONDITIONS

Readily available reports, plans, initiatives, and studies were reviewed to compile existing and future conditions that may impact this CWMP for the Town of Lunenburg. The sources utilized include information from the following sources:

- Town of Lunenburg (the Town);
- Executive Office of Environmental Affairs (EOEA);
- Montachusett Regional Planning Commission (MRPC);
- Department of Housing and Community Development (DHCD);
- Department of Conservation and Recreation (DCR, formerly DEM);
- Department of Environmental Protection (DEP);
- Nashua River Watershed Association (NRWA);
- United States Environmental Protection Agency (US EPA), and
- United States Geologic Survey (USGS).

A bibliography is included as Appendix E.

2.1 CONDITIONS IN PLANNING AREA

2.1.1 Planning Area and Planning Period

2.1.1.1 Planning Area

The planning area includes the town of Lunenburg with focus on areas that may create additional demand to the Town sewer system or that may require construction, reconstruction, or repair to the existing wastewater systems. The focus areas include those areas that have been impacted by failed or poorly performing on-site wastewater disposal systems and areas of recent or proposed development. In addition, the planning area takes into account the extent of the sub-watershed basins that may influence this CWMP. The sub-basin boundaries extend beyond the boundaries of the Town; and, general discussions within this CWMP may incorporate issues extending beyond the Town boundary but the intent of the planning area is focused on the Town. Refer to Figure 2-1 for a Project Location Map.

2.1.1.2 Planning Period, 2006-2026

This CWMP is based on a planning period of 20 years. The study year of the CWMP is 2006 and the end of the planning period is 2026.

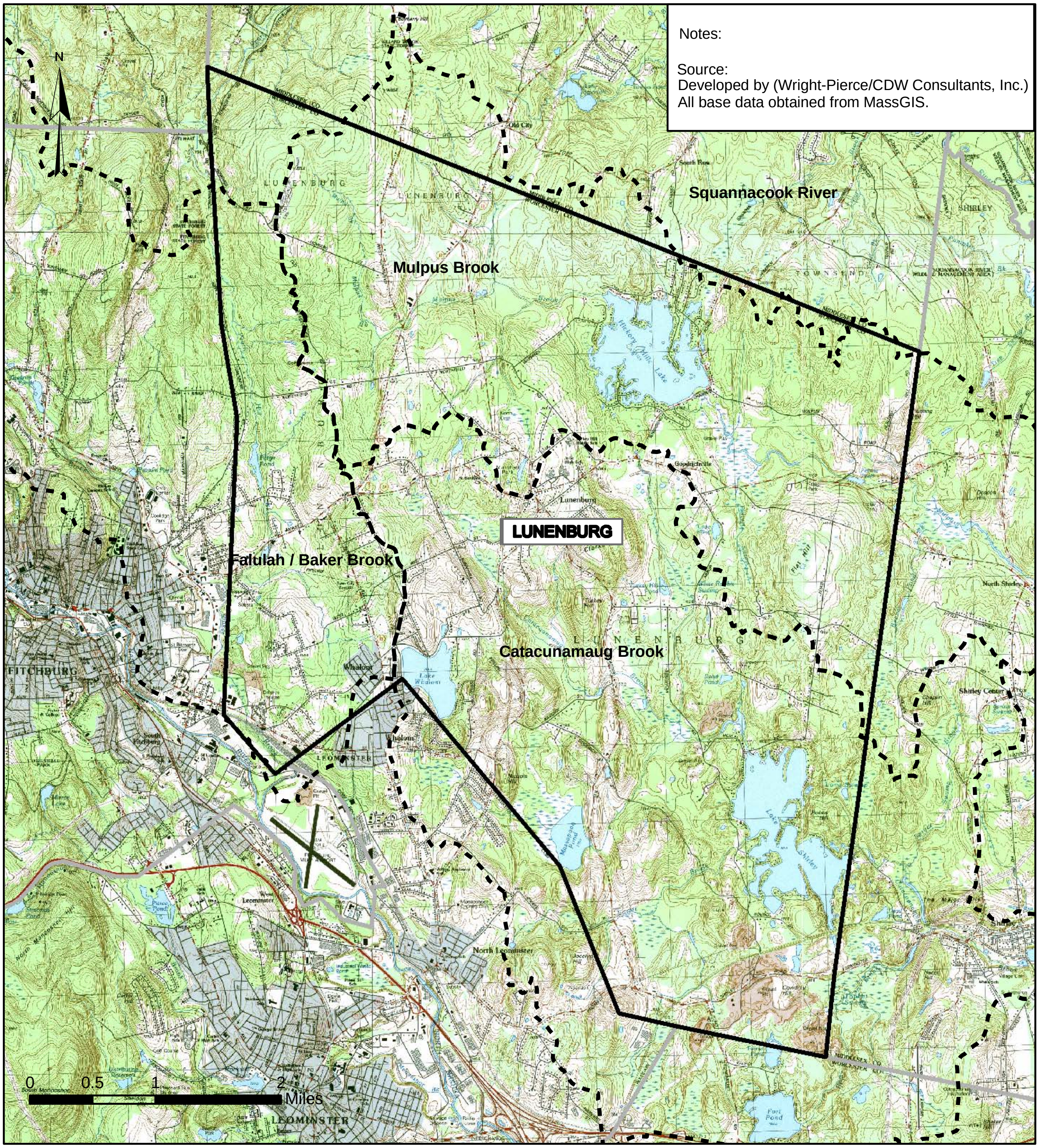
2.2 BASIN WIDE INITIATIVES AND OTHER FACILITIES PLANS FOR THE TOWN'S WATERSHED BASIN

At local, state, and federal levels of government, initiatives have been established to promote a balance between economics and the environment. Since the mid 1970s, studies, plans, and reports have been completed regarding projected Town growth and growth demands for wastewater management. This section of the CWMP focuses on the environmental initiatives and plans that have been developed to minimize environmental impacts to the sub-watershed basins within the town of Lunenburg. Below is a description of the sub-watershed basins, a list of initiatives and plans that have been established, and the impacts that those initiatives may have on this CWMP.

2.2.1 Description of the Town's Watershed

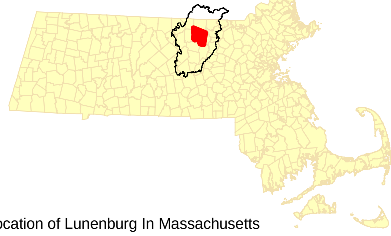
The town of Lunenburg lies within the Nashua River Watershed Basin, which serves 31 watershed communities in north central Massachusetts and southern New Hampshire. The watershed of the Nashua River is a basin in which all precipitation that falls geographically within the basin ultimately flows down gradient to the river. The Nashua's watershed encompasses 538 square miles.[1] The majority of the Town lies within three sub-basins: Catacunemaug Brook, Mulpus Brook, and Falulah/Baker Brook. Refer to Figure 2-2 for the delineation of the sub-basin boundaries.

[1] Nashua River Watershed 5 Year Action Plan 2003-2007



Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.



Location of Lunenburg In Massachusetts

LEGEND

- Subwatershed Basins
- Subwatershed Basins
- Lunenburg Town Boundary
- Town Boundaries

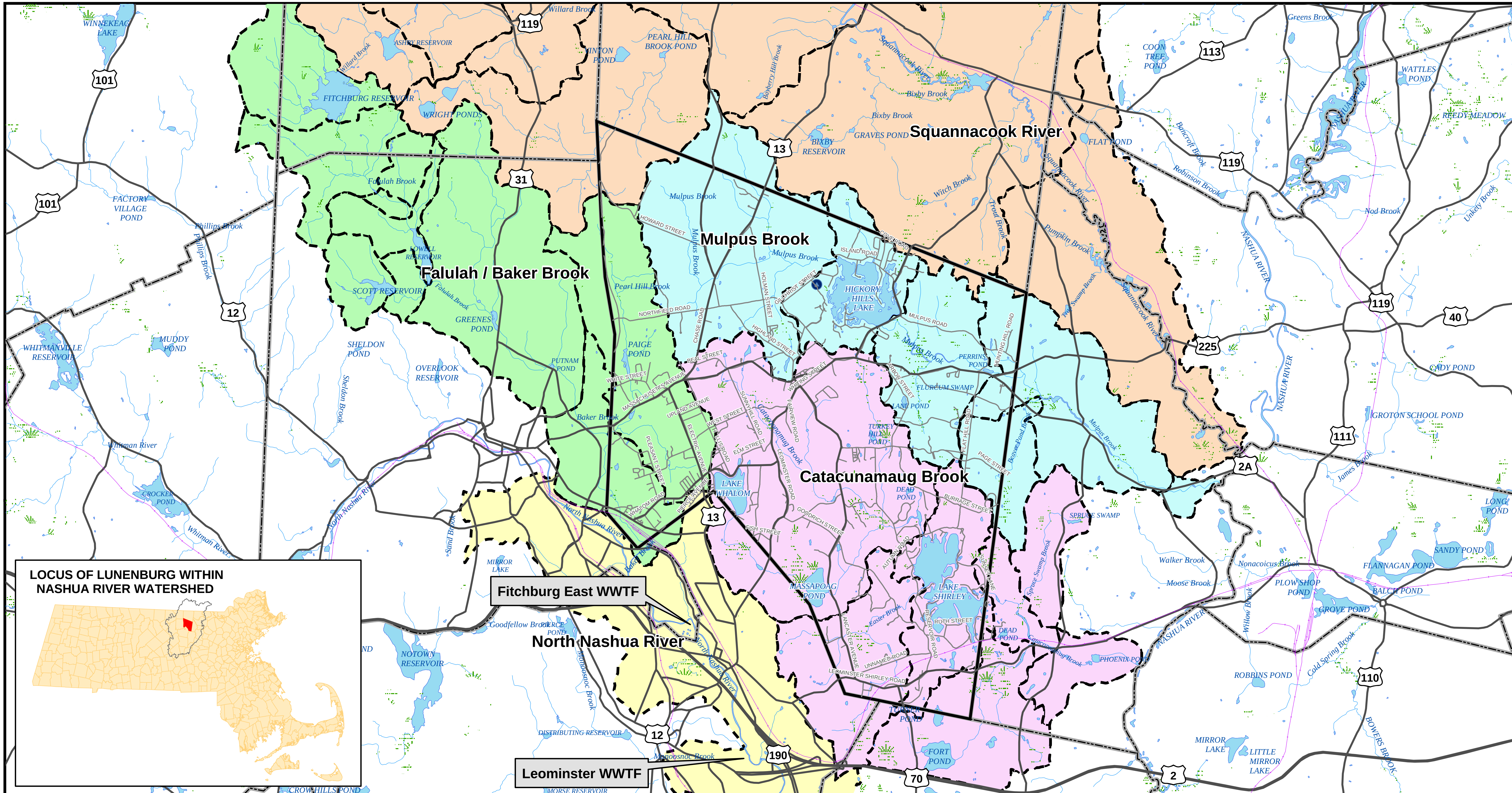
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

PROJECT LOCATION MAP

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-1



LEGEND

- Catacunamaug Brook
- Falulah / Baker Brook
- Mulpus Brook
- Squannacook River
- North Nashua River
- Lakes and Ponds
- Wetland
- Major Roads
- Minor Roads
- Rail Roads
- Town Boundaries
- Lunenburg Town Boundary
- Rivers and Streams
- Groundwater Discharge Point

N

0 0.5 1 2 Miles

0 3,400 6,800 13,600 Feet

Notes:

Source: Developed by Wright-Pierce/CDW Consultants, Inc.
All base data obtained from MassGIS.

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

SUBWATERSHED BASINS

PROJ NO:	10849B
DATE:	Oct 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE: 2-2

2.2.1.1 Catacunamaug Brook Sub-Watershed Basin

Geographic Characteristics

The Catacunamaug Brook sub-basin extends to state highway Route 2A as much of the northern boundary, state highway Route 2 along the southern boundary, and state highway Route 13 along the western boundary defined by a ridgeline. The Catacunamaug sub-basin extends into the town of Leominster to the southwest, the town of Lancaster to the south, and the town of Shirley to the east. More than half of Lunenburg is located within the Catacunamaug sub-basin. A statistical summary of the Catacunamaug sub-basin is included in Table 2-1.

TABLE 2-1
STATISTICAL SUMMARY OF THE CATACUNAMAUG SUB-BASIN[2]

Land Area:	20 square miles
Primary Municipalities:	Lunenburg, Shirley
Permanently Protected Land Area:	1,249 acres or 20 percent
Limited Protection Land Area (Chap. 61, etc.):	1,335 acres
Feeder Streams:	Bow Brook, Easter Brook, Spruce Brook
Percent Imperviousness:	Approximately 10%
# of MA NHESP* Priority Sites:	6
# of NPDES* Discharge Permits:	1 minor
Most Threatened Water Bodies:	Fort Pond, Lake Shirley

2 Source: http://www.nashuariverwatershed.org/5yr_plan/subbasins/catacunemaug.htm
* Glossary

The Catacunamaug sub-basin lies within the Southern New England Coastal Plains and Hills ecoregion, which is geologically comprised of glacial till and outwash deposits. This sub-basin drains to the southeast into the mainstem of the Nashua River. The streamflow of the Catacoonamaug Brook, as well as contributory streamflows have significant seasonal changes, as are expected in the northeast.

Land Use

The land use for this sub-basin is primarily forest or wetland. There are some small portions of residential and agricultural, open-protected or limited protection-land. Approximately 10 percent is classified as a total impervious area, which indicates that issues of compromised stormwater and other non-point sources of contaminants (pesticides, fertilizers, oils, asphalt, pet wastes, salt, sediment, human litter and other debris) may exist or impact this sub-basin.[3]

The Catacunamaug sub-basin has been recognized as a good source for both water supply and recreation for the Town. The Catacoonamaug Brook provides excellent riparian[*], wildlife and aquatic habitat. Man-made threats to the brook and related waterbodies include: storm drain discharges, road runoff, agricultural practices, and construction activities.[4]

Major Water Resources

Water Bodies

The major waterbodies in this subbasin include the Massapoag Pond, Lake Whalom and Lake Shirley. Massapoag Pond, located in southern Lunenburg, is without significant shoreline development. The Harris Farm APR* protects the entire eastern half of Massapoag Pond, and while large wetlands surround the entire western half. Lake Whalom contains non-native plants. Lake Shirley is in a eutrophic state, enriched by nutrient loading that in turn stimulate plant growth

[3] Nashua River Watershed 5 Year Action Plan 2003-2007
[*] Glossary
[4] Nashua River Watershed 5 Year Action Plan 2003-2007

and the deplete oxygen in the lake. Lake Shirley is noted for having noxious and non-native plants, and high turbidity.[5]

There are numerous minor waterbodies that are tributary to the Catacunamaug sub-basin. Dams within this sub-basin are located in: Bow Brook and Lake Shirley. There are no apparent negative impacts from impoundments identified, on the sub-basin. Area underlying Lake Shirley is classified as a high-yield aquifer with a medium-yield aquifer abutting and extending along the southeastern Town boundary, into Lancaster. Refer to Figure 2-3 for delineation of the aquifers.

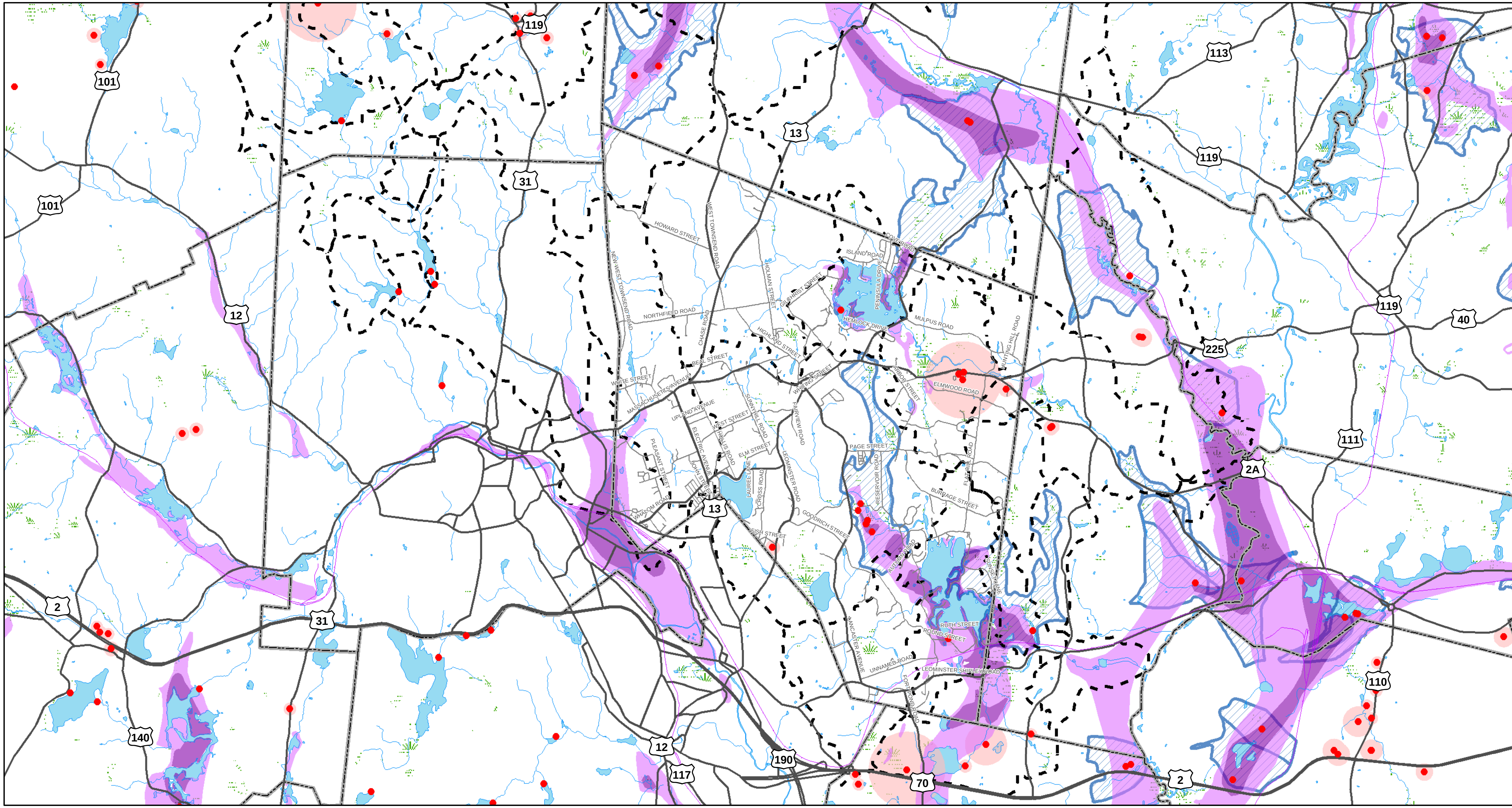
Water Supply Withdrawal

According to MassGIS*, within the Catacunamaug sub-basin, there are 12 public water supply (PWS) wells. In addition, in close proximity to the eastern Town boundary, the Shirley Water District has one Water Management Act (WMA) permitted withdrawal located in the Catacunamaug sub-basin for withdrawal of 0.3 million gallons a day (MGD) of groundwater.[6]

Potential Water Supply Contaminate Sources

According to MassGIS, there are no wastewater treatment facilities in this sub-basin. There are three DEP Bureau of Waste Prevention (BWP) Major Facilities that are Large Quantity Toxic Users.* These facilities are located in the southeast area of Lunenburg. One of the facilities, P.J. Keating Company, has a minor industrial National Pollutant Discharge Elimination System (NPDES) permit, which discharges into Lake Shirley and Bow Brook-Shirley. Within this sub-basin, there are three Massachusetts Department of Environmental Protection

[5] Nashua River Watershed 5 Year Action Plan 2003-2007, November 16, 2006.
[6] Nashua River Watershed 5 Year Action Plan 2003-2007



LEGEND

- Public Water Supplies
- High Yield Aquifers
- Medium Yield Aquifers
- Low Yield Aquifers
- Till
- Interim Wellhead Protection Areas
- DEP Approved Zone IIs
- Subwatershed Basins
- Rail Roads
- Major Roads
- Minor Roads
- Rivers and Streams
- Lakes and Ponds

N

0 0.5 1 2 Miles

Notes:

Source: Developed by Wright-Pierce/CDW Consultants, Inc.
All base data obtained from MassGIS.

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

AQUIFERS & PUBLIC WATER SUPPLIES

PROJ NO:	10849B
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FIGURE: **2-3**

(MA DEP) listed disposal sites[*] in Lunenburg and one in each abutting communities of Shirley and Leominster. The disposal sites in Shirley and Leominster include Activity and Use Limitations[*] (AULs). There is one listed inactive solid waste landfill that is located in Shirley, abutting the eastern Lunenburg boundary. Within the Catacunamaug sub-basin, there are eight state registered underground storage tanks (USTs) located within the Town; and, there are three state-registered USTs in Leominster in close proximity to the Lunenburg southern boundary. Refer to Figure 2-4 – Regulated Sites.

Water Quality Reports

Water quality reports have identified high fecal bacteria counts at various lakes and ponds within this sub-basin. A review of the NRWA's five year plan indicates that samples taken in Shirley at the outfall of Sampson Pond and adjacent to a housing development indicated high coliform readings. To date, the water quality analysis from Lake Shirley in Lunenburg has not indicated a problem with fecal coliform, nor is the Board of Health aware of any testing in Lunenburg that have indicated high bacteria readings for any length of time. The overall results of the water quality reports indicated that other than occasional high fecal counts, the Catacoonamaug brook is healthy and capable of supporting a cold-water fishery[7].

2.2.1.2 Mulpus Brook Sub-Watershed Basin (medium-stressed)

Geographic Characteristics

The majority of the Mulpus Brook sub-basin lies within Lunenburg. The sub-basin extends into the town of Shirley on the east, and a small portion extends into the town of Townsend to the north. The state thoroughfares Route 13, Route 2A, and Route 225 travel through the Mulpus sub-basin.

[*] Glossary
[*] Glossary
[7] Nashua River Watershed 5 Year Action Plan 2003-2007

The Mulpus sub-basin lies within the same ecoregion as the Catacunamaug sub-basin, where the geology consists of glacial till and outwash deposits, and drains to the southeast into the mainstem of the Nashua River. Mulpus Brook is impounded behind the Hickory Hills Dam, and forms the Hickory Hills Lake. A statistical summary of Mulpus sub-basin is included in Table 2-2.

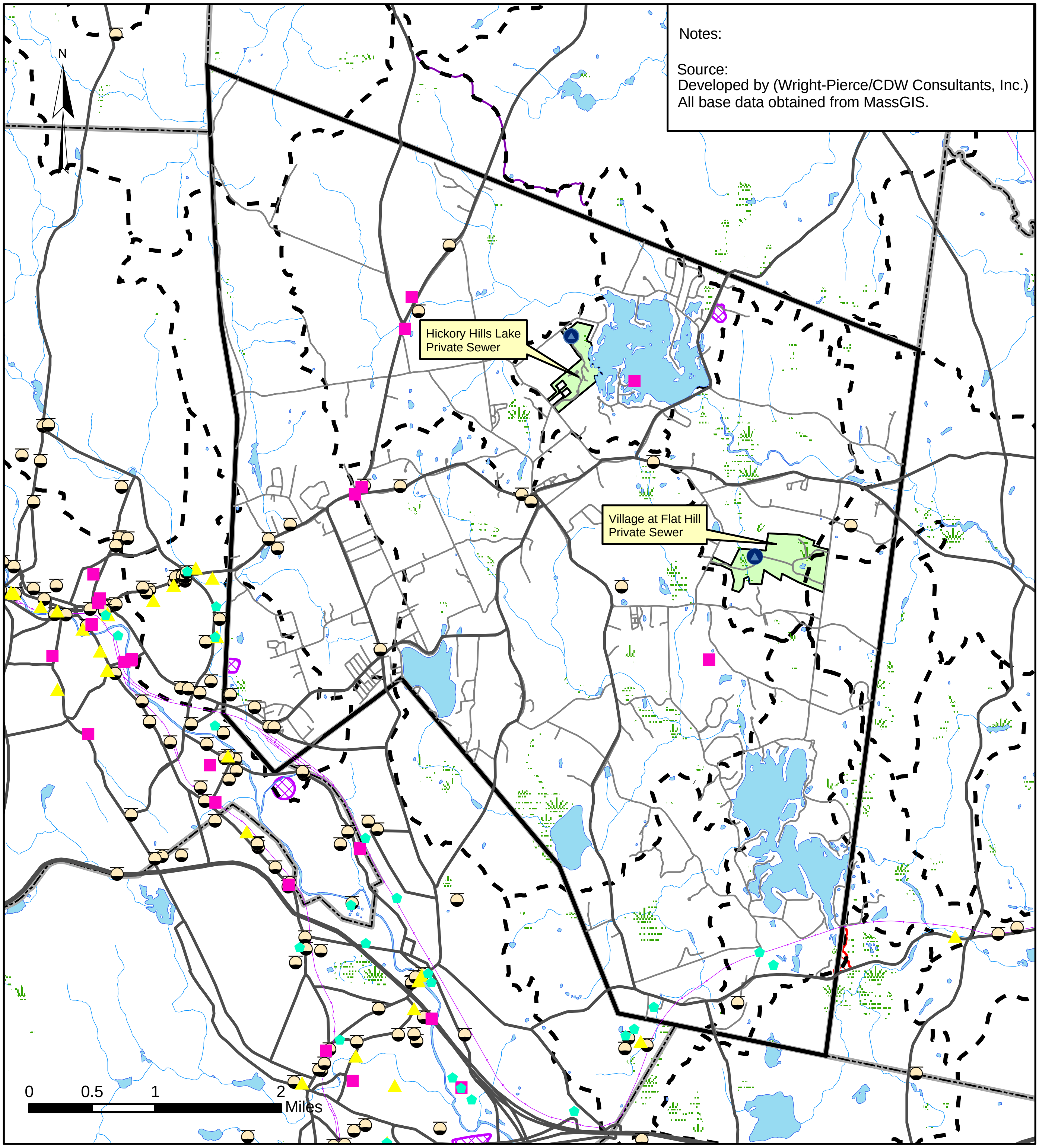
TABLE 2-2
MULPUS BROOK SUB-BASIN STATISTICAL SUMMARY[8]

Land Area:	15.9 sq miles
Primary Municipalities:	Lunenburg, Shirley
Permanently Protected Land Area:	1,682 acres or 32 percent
Limited Protection Land Area (Chap. 61, etc.):	1,585 acres
River length:	24.6 miles
Feeder Streams:	Beaver Pond Brook
Percent Imperviousness:	Approximately 7%
# of MA NHESP Priority Sites:	4
# of Discharge Permits:	0
Most Threatened Water Bodies:	Hickory Hills Lake

Land Use

The land use for this sub-basin is approximately primarily forest or wetland, with some portions of residential, and agricultural, open-protected or limited protection-land. There is approximately 7 percent impervious land, which indicates possible stormwater and other non-point sources of contaminants.[9] A portion of the Squannassit ACEC[*] lies within this sub-basin, including the Cowdrey Nature Center.

[8] Source: http://www.nashuariverwatershed.org/5yr_plan/subbasins/mulpus.htm
[9] Nashua River Watershed 5 Year Action Plan 2003-2007
[*] Glossary



LEGEND

- DEP BWP Major Facilities
- Groundwater Discharge Points
- Tier Classified 21E Sites
- Sites with Activity & Use Limitations
- Underground Storage Tanks
- Solid Waste Facilities (Inactive)
- Solid Waste Facilities (Closed)

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

REGULATED SITES

PROJ NO:	10849B
DATE:	Oct. 2006
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FIGURE:
2-4

In 2000, the Shirley Greenway Committee conducted a shoreline survey of Mulpus Brook in Shirley. Several problems were noted, including a septic discharge situation at a mobile home park and sedimentation build-up at various road crossings. However, the brook was noted as having a good buffer between the brook and development, and having high water quality.

Major Water Resources

In March 2002, a Hydrologic Analysis was completed by Camp, Dresser, McKee (CDM) under contract with EOEA for the Massachusetts Watershed Initiative Nashua Team. The analysis concluded that the Mulpus Brook sub-basin was under a medium level of stress* under 7Q10[*] conditions. Also, the analysis looked ahead to 2020, and projected the Mulpus sub-basin will remain under a medium level of stress. This means that the net 7Q10 outflow from the sub-basin equals or exceeds the estimated natural 7Q10. 7Q10 is the lowest consecutive 7 day streamflow that is likely to occur in a ten year period in a particular river segment.[10]

Water Bodies

In this sub-basin, the major water body is Hickory Hills Lake. The feeder streams to Mulpus Brook include Beaver Pond Brook, which has its source in a wetland at the western base of Chaplins Hill in the town of Shirley. There is a wetland complex at the confluence of Beaver Pond and Mulpus Brooks at the base of Deacon Hill.[11]

Water Supply Withdrawal

There are no WMA permitted water withdrawals in this sub-basin. There are several smaller areas underlying the land abutting Hickory Hills Lake and to the northeast of the lake which are classified as medium- and high-yield aquifers. There is also an underlying area down gradient of the Hickory Hills Lake that is a medium-yield aquifer.

[*] Glossary
[10] Nashua River, Hydrogeologic Analysis, CDM, 2002
[11] Nashua River Watershed 5 Year Action Plan 2003-2007

According to MassGIS*, within the Mulpus sub-basin there are five public water supply (PWS) wells within Lunenburg. There is one PWS located in the town of Shirley, near Beaver Pond Brook, that is within close proximity to Lunenburg.

Potential Water Supply Contaminate Sources

Within this sub-basin, there are two private wastewater treatment facilities located in the town of Lunenburg. One facility is permitted with a groundwater discharge permit issued for the Woodlands Lakeshore Village on Royal Fern Drive. The June 2006 facility report results for the Woodlands facility meet the current permit requirements. The other private wastewater treatment facility is located on Arbor drive in the village of Flat Hill. Within the Mulpus sub-basin, there are three sites with state-registered USTs within the town of Lunenburg identified by MassGIS. MassGIS identified two (2) registered USTs within the town of Lunenburg that are both 1,000-gallon capacity and one containing diesel and the other containing gasoline. Refer to Figure 2-4 Regulated Sites.

Water Quality Reports

Water quality results were provided by the Lunenburg Board of Health. Seasonal samplings for the years of 2004 through 2006 were performed at Hickory Hills Lake for *Escherichia coli* (*E. coli*)[*]. The results indicate that there has been one exceedance to the standard of 235 cfu/100 ml in August 2005. Hickory Hills Lake has been noted for having elevated mercury concentrations in its largemouth bass[7].

2.2.1.3 Falulah/Baker Brook Sub-Watershed Basin

Geographic Characteristics

The majority of the Falulah/Baker Brook sub-basin lies in the community of Fitchburg, with portions extending north into the communities of Ashby and Ashburnham and to the east into the town of Lunenburg. Approximately 1/5 of this

[*] Glossary

sub-basin extends into Lunenburg. Route 31 bisects this sub-basin and Routes 2A and 13 pass through a portion.

The Falulah sub-basin lies within the same ecoregion as the Catacunamaug sub-basin and Mulpus sub-basin, where the geology consists of glacial till and outwash deposits. The Falulah sub-basin begins at higher elevation points in the towns of Ashby and Ashburnham. There is a considerable amount of protected watershed supply at the headwaters. Falulah Brook flows southeasterly through the city of Fitchburg, paralleling the commercial strip of the John Fitch Highway, where it is affected by urban influences before entering the town of Lunenburg. A statistical summary of the the Falulah/Baker sub-basin is included in Table 2-3.

TABLE 2-3
FALULAH/BAKER BROOK SUB-BASIN STATISTICAL SUMMARY[12]

Land Area:	16 sq miles
Primary Municipalities:	Fitchburg
Permanently Protected Land Area:	1313 acres or 14 percent
Limited Protection Land Area (Chap. 61, etc.):	201 acres
River length:	7.8 miles
Feeder Streams:	Pearl Hill Brook "Saima" Brook
Percent Imperviousness:	Approximately 11%
# of MA NHESP Priority Sites:	1
# of Discharge Permits:	0
Most Threatened Water Bodies:	Putnam Pond, Greenes Pond
Reservoirs	Falulah, Fitchburg, Lovell, Scott

[12] Source: http://www.nashuariverwatershed.org/5yr_plan/subbasins/falulah.htm

Land Use

The land-use pattern for the Falulah sub-basin is predominantly forest or wetland. The majority of residential development is low density; however and primarily in the city of Fitchburg, there are concentrated residential settlements and commercial development along major roads and in subdivisions. Approximately 5 percent of land area is agriculture, open-protected or limited-protected. Most of the agriculture area is in the Hertel and Marshall Agricultural Protection Restricted (APR) farms in Fitchburg. In the northeastern section of this sub-basin, the 330-acre ArnHow Farm (Fitchburg) has been removed from the Chapter 61A program**,** which offered limited protection of the land, and is now being developed. There are some smaller APR tracts in Fitchburg and Ashby.

Within Lunenburg there are several APR parcels for recreation and a smaller APR for agriculture. Commercial operations, industry and other developed land uses are numerous and include densely-populated, highly urbanized areas with large paved areas (e.g. Wal-Mart shopping center in Lunenburg). There are no immediate concerns of compromised stormwater and other non-point sources of contaminants within this sub-basin.[13]

Major Water Resources

Water Bodies

Major water bodies in this sub-basin include the Falulah, Fitchburg, Lovell, and Scott Reservoirs; and Greenes, Paige and Putnam's Ponds, which contain noxious and non-native plants. Feeder streams to Falulah Brook include Saima Pond and Greenes Pond. Pearl Hill Brook runs through Paige Pond in the town Lunenburg. Bakers Brook begins at the confluence of Falulah and Pearl Hill Brooks.

[13] Nashua River Watershed 5 Year Action Plan 2003-2007

Water Supply Withdrawal

There are no public water supplies (PWS) in the Falulah sub-basin within Lunenburg. Refer to Figure 2-3 Aquifers & Public Water Supplies.

Potential Water Supply Contaminant Sources

There are no wastewater treatment facilities (WWTF) located within the town of Lunenburg in this sub-basin. There are no listed disposal sites* within this sub-basin for the Town. There is one listed solid waste landfill that has been closed and one within Fitchburg, near the southwest boundary of Lunenburg. For this sub-basin, there are eight state-registered USTs within this sub-basin for the Town. There are many state-registered USTs and AULs* within Fitchburg, in close proximity to the western boundary of Lunenburg. Refer to Figure 2-4 Regulated Sites.

EPA issued the East Fitchburg WWTF an Administrative Order in July 1996, requiring the City to develop a long-term CSO control plan. The City submitted a Draft Plan and Sewer Separation Study in January 1999 and additional financial information in March 2000, which is still on-going.

Water Quality Reports

According to the NRWA five-year plan, the East Fitchburg Wastewater Treatment Plant is permitted to discharge storm water and wastewater from several combined sewer overflows to Baker Brook and several unnamed streams.

2.2.2 Initiatives/Plans Relating to the Town's Watershed Basin and their Potential Impacts to this CWMP

As previously discussed, a bibliography of reports, plans, initiatives and studies that relate to this CWMP are compiled in Appendix E. Prior to finalizing the Phase II Report, Management Techniques and Alternatives Identification and Screenings, for this CWMP,

* Glossary

the following bylaws, regulations and studies, will be taken into consideration for reserving and protecting the watersheds within Lunenburg. A summary of the initiatives and their potential impacts to this CWMP follows.

2.2.2.1 Local Level – Town of Lunenburg

The Town has developed several land use controls to manage growth and natural resources. These controls include:

- Protective bylaws,
- Subdivision regulations,
- Wetland protection bylaws, and
- Sanitation guidelines.

These controls outline procedures for development with partial constraints for preservation. Also, the Town has prepared a Master Plan that provides the basis for decision-making regarding the long-term physical development for the Town.[14] An Environmental Impact Report (EIR) and accompanying wastewater facilities plan is also discussed. The following are summarized portions of the Town's bylaws, regulations and plans that may affect this CWMP.

<u>Protective Bylaw of the town of Lunenburg</u>

The Town's goal of the Protective Bylaw is to preserve open space and natural features.[15] This bylaw defines the types and locations of districts and the permissible uses. The following are summarized excerpts that may impact this CWMP.

[14] Lunenburg Master Plan, April 2002
[15] Lunenburg Master Plan, April 2002

Water Supply Protection District

The protective bylaw delineates three zones within the Water Supply Protection District. These zones coincide with the aquifer boundaries defined in 310 CMR 22.00 – Massachusetts Drinking Water Regulations.[16]

> *Restricted Area Zone 1*[*], which is the area of a radius of four hundred feet from the well site on file with the Planning Board and Town Clerk and the area within a circle of radius of four hundred feet from the potential well sites identified in the report titled Test Well locations Selected from Seismic Profile Analysis, Lunenburg, Massachusetts, dated Fall 1985, on file with the Planning Board and Town Clerk.
>
> *Zone 2*[*], which includes the area that directly contributes recharge to the production well, as designated on Map 1 of the Aquifer Land Acquisition Map of the Lunenburg Water District, by Dufresne-Henry, Inc., 2004.
>
> *Zone 3*[*], which includes the area through which surface and groundwater discharges into Zone 2, as designated on Map 1 of the Aquifer Land Acquisition Map of the Lunenburg Water District, by Dufresne-Henry, Inc., 2004.

This bylaw lists permissible uses for each zone and prohibitive uses for Restricted Area Zone 1 and Zone 2. This bylaw states that by Special Permit granted by the Planning Board, public utilities and facilities are allowed in Zone 2 provided that no adverse impact on surface water or ground water will occur. However, within Restricted Area Zone 1 and Zone 2, sewage treatment facilities are prohibitive uses.

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[16] Lunenburg Master Plan, April 2002
[*] Gossary
[*] Gossary
[*] Gossary

Phased Growth

The phased growth bylaw allows Town growth at a manageable rate to ensure that Lunenburg has adequate time to expand its resources in a way to protect and promote the public health, safety and welfare of the Town. This bylaw limits the number of building permits and dwelling units per year with exceptions for proposals of affordable housing, and units designated for persons 55 and older. This CWMP will take into consideration the allowable units as dictated in the bylaw for phased growth when staging any portions of the CWMP over the planning period.

Smart Growth District

During the last Town Meeting, Lunenburg adopted a Smart Growth District that includes the Tri-Town Drive-In property. Town officials encourage the development of a 204-unit apartment complex built on the site of the Tri-Town Drive-In, believing the project will bring the town's stock of affordable housing closer to state-mandated levels, without utilizing untouched open space.[17]

Prior to finalizing plans for wastewater management for the Town, the Protective Bylaws will be incorporated to avoid appeals to the Bylaws. And, in particular, the Water Supply Protection District zones and their permissible and prohibitive uses will be incorporated into the CWMP.

Wetlands Protection Bylaw and Regulations

The purpose of this bylaw is to protect wetlands, the resources relating to wetlands, and land adjacent to wetlands within the Town's watershed basin. This bylaw includes Conditional Exemptions and a set of General Provisions.

[17] http://www.sentinelandenterprise.com/ci_3531514

Section 3: Conditional Exemptions

The Conditional Exemptions state that the permit and application requirements do not apply to maintaining, repairing, or replacing existing structures or facilities used in the service of the public to provide electric, gas, water, telephone, telegraph or other telecommunication. However, the Conditional Exemptions are not specific to sewer and this will be considered if a needs area will require rehabilitating existing sewer located in areas that fall within the jurisdiction of this bylaw. The Conditional Exemptions also states that emergency projects necessary to protect the public health and safety falls under exemption from the bylaw if the emergency is through orders by the Commonwealth or a political subdivision thereof. The Commission must certify emergencies prior to the start of work.

General Provisions

In General Provisions within Section 10.53 (c), there is discussion that construction, reconstruction, operation and maintenance of underground utilities such as sewer is permissible with the following general conditions:

- The issuing authority may require a reasonable alternative route with fewer adverse effects for a local distribution or connecting line not reviewed by the Energy Facilities Siting Council; (EFSC)[*]
- Best available measures shall be used to minimize adverse effects during construction;
- The surface vegetation and contours of the area shall be substantially restored;
- Applications of herbicides shall not occur within 30 feet of a wetland or water body during maintenance of the line; and
- All sewer lines shall be constructed to prevent inflow and leakage.

[*] Gossary

Rules and Regulations Governing the Subdivision of Land

In part, the purpose of the subdivision regulation is to regulate the lay out and construction of subdivisions and to ensure sanitary conditions in subdivisions and in proper cases parks and open areas.[18] The regulations emphasize requirements in connecting to sewer where available or in the areas of proposed sewer. Specifically, in subsection 4.10.2 Sewerage, paragraph 4.10.2.1: "If a public sewerage system is located within five hundred (500) feet down slope from a non-residential or multiple family subdivision or within two hundred (200) feet of a one (1) or (2) family subdivision, all lots shall be connected to the public sewerage system by the developer." Also in subsection 4.10.2 Sewerage, paragraph 4.10.2.2: "A developer of a project that plans to install sewer two hundred (200) feet down slope of any subdivision is required to provide sewer connections in the street and to every lot which can be connected later to public sewerage within three (3) years of the Definitive Plan submission date." Otherwise, private on-lot or communal sewerage systems as approved by the Board of Health shall be installed. In addition, proposals for small WWTFs shall include an engineering study evaluating other options including decentralized systems and connection to public sewers and must be consistent with the Lunenburg Wastewater Facilities Plan, June 1999.

Board of Health Regulations

The Board of Health regulations set more stringent standards to protect wetlands and water courses such as streams and ponds, by requiring greater distant setbacks between the on-site wastewater disposal systems and the wetlands or water courses than the Title 5 requirements. In addition, the regulations require greater depths between high groundwater elevations and the bottom of the proposed leaching system to be utilized in the event that determination of high groundwater is not possible using soil evaluation. If soil evaluation is used, groundwater offsets are not more stringent than Title 5. These separation depths are based on seasonal changes, which is not a

[18] Rules and Regulations Governing the Subdivision of Land, latest revision 2002.

factor in Title 5. The intent of these regulations is to further protect the wetlands, water courses, and groundwater within the Town's watershed sub-basin.

There are many areas of surface water, wetlands and high groundwater within the town of Lunenburg. This can present a limiting factor for leaching systems, and creates restrictions on buildable lots.

Wastewater Facilities Plan, June 1999

The Wastewater Facilities Plan outlined the wastewater needs and priorities for the town of Lunenburg. This Facilities Plan superseded the Sewer Impact Study by Thomas Planning Service, 1995. The needs were based on several criteria:[19]

- Development density: This is a concentration of occupied residential and commercial properties in an area (e.g., Whalom) or along a strip of roadway (e.g. lakefront areas);
- Poor soil conditions: Adverse characteristics include poor percolation rates, high groundwater, or an impervious layer of soil near the surface;
- Availability of sewers: When sewers exist in proximity to an area with on-site wastewater disposal system problems, public interest in extending sewers escalates;
- Record of existing on-site wastewater disposal system problems: From discussions with the Board of Health and review of its records, areas with higher incidence of problems were identified;
- Potential health issues: These issues relate to leachate breaking through the soil causing immediate health risk and threatening water quality; and
- Interest of residents: This is garnered from public hearings and response to questionnaires.

[19] Town of Lunenburg Wastewater Facilities Plan, June 1999.

Based on the above criteria and the cost-effectiveness, the recommended plan was to install sewers to the Needs Areas and to collect the wastewater for discharge to facilities in Fitchburg and Leominster. This recommended plan was for a 20 year period for three priority areas. First, sewers would be constructed to serve the Town Center and Whalom area and discharge to Leominster through an existing sewer that was currently serving a portion of Whalom. The second area for sewers would be the Baker Station and Lower Massachusetts Avenue. The third area for wastewater management would be the lakefront areas of Lake Shirley and Hickory Hills, with Lake Shirley given higher priority. This plan was utilized to form the basis for the Master Plan recommendations to prioritize the initiation of expanding sewers within the Town.

<u>Single Environmental Impact Report (EIR), December 17, 2001</u>

A Single EIR was submitted with the findings of the 1999 Wastewater Facilities Plan. The EIR discussed the priorities and alternatives for sewer installation for the town of Lunenburg. Potential environmental impacts were listed and ranked for each priority area and alternatives. The following is a summary of the EIR mitigation measures proposed to minimize environmental impacts:

- Silt and dust controls;
- Scheduling of construction work and operations to minimize impacts to businesses and houses;
- Identification of Elderberry Borer Beetle habitats;
- Construction safety;
- Maintenance of existing zoning;
- Force mains and gravity sewers will be tested to minimize infiltration/exfiltration;
- Manholes to be installed with watertight covers;
- Telemetered alarms to be installed at pump stations and DEP approved emergency contingency plans would be available;

- Special bedding will be used for piping; and
- Service connections will be rigidly inspected by appropriate municipal officials with certified reports to DEP.

In addition, a hydrologic impact study was performed based on the CDM model that was used for the Hydrologic Assessment of Nashua River Watershed.[20] This study included existing and speculated statistics for year 2000 through 2020. The study concluded during average conditions the impact of human withdrawal from the Town's watershed is insignificant. However, during very low flow periods (7Q10[*]), human withdrawal becomes significant. As discussed earlier, the Mulpus sub-basin is currently a medium stressed based during 7Q10[*] conditions. The study indicated the Catacunamaug and Falulah sub-basins will remain at low stress (7Q10 conditions) following expansion of the sewer system through year 2020.

In summary, the EIR stated that the environmental impacts for the phased sewer expansion are minimized because the construction is mostly confined to the public ways. The project satisfied Executive Order 385* in that it serves existing developed areas, will revitalize devalued properties (with poor performing or failed septic systems), and it employs regional solutions to the Town's wastewater needs.[21]

Lunenburg Master Plan, April 2002

The Lunenburg Master Plan recommendations include "Plan and Implement the Enhancement and Maintenance of Municipal Services" (Envision 2006 #1). The first priority of Envision 2006 #1 is Town sewer system expansion, which is based on several studies. The goals were identified as the following:[22]

- Continue with the construction of sewers as outlined in the Wastewater Facilities Plan;

[20] Hydrologic Assessment Nashua River Watershed, March 2002.
[*] Glossary.
[*] Glossary.
[21] Single EIR for Lunenburg Comprehensive Wastewater Management Plan, December 17, 2001.
[22] Lunenburg Master Plan, April 2002

- Continue to update Inter-municipal agreements with the cities of Fitchburg and Leominster as need is determined;
- Establish a line of communication with Devens through the town of Shirley for possible connection to the proposed Devens Wastewater Treatment Facility; and
- Promote the expansion of industrial facilities with the proposed extension of sewers to the industrial zoned area in Lunenburg.

2.2.2.2 State Level

Areas of Critical Environmental Concern, Squannassit Designation

Portions of the Squannassit ACEC* lie within the town of Lunenburg. There are more than 4,000 acres of the Squannassit ACEC that lie within the Town. These areas are primarily in the Mulpus Brook and Catacoonamaug Brook sub-basins; however, there is a portion in the northwest corner of the Town that lies within the Squannacook sub-basin. Refer to Figure 2-5, Environmentally Sensitive Areas.

This ACEC was designated in December 2002. The Nashua River corridor is a central resource for this ACEC. The contributing resources for the Squannassit ACEC include water supplies, habitat resources, land use and open space. All three of these supporting categories exist within the portion of the ACEC within Lunenburg.

The Catacunemaug/Lake Shirley aquifer and the Hickory Hills Lake aquifer are partially located within the ACEC; however, the drinking water supply wells are located outside of the ACEC. The EOEA stated that the regional significance of the aquifers, and the existing and potential water supplies merit future consideration of expanding the boundary.

* Glossary

Certified vernal pools, priority habitats for rare species and estimated habitats for rare wildlife, exists within the ACEC portions of Lunenburg as indicated in the Figure 2-5.

The land use and open space within the ACEC boundaries in Lunenburg include 480 acres of Chapter 61 APR lands, and 595 acres in the Lunenburg Cowdrey Nature Center area, as well as significant scenic sites.[23]

The ACEC program regulates designations of ACECs and directs the EOEA to take action, administer programs and revise regulations to preserve, restore, and enhance the natural and cultural resources of the ACECs.[24] The ACEC program does not regulate development within the boundaries; however, the purpose and goals of the designations are implemented through a variety of state agency programs and regulations. Examples of state programs that address ACECs that may be relevant to the Squannassit designation and this CWMP include state programs which consider ACEC issues when reviewing water withdrawal permit applications pursuant to the Water Management Act[25], such as the DEP Drinking Water Program, the Watershed Permitting Program, and the DCR Office of Water Resources. Another program addressing ACEC designations is the disposal site[*] classification provisions of the Massachusetts Contingency Plan (310 CMR 40.00). This state program is administered by the DEP Bureau of Waste Site Cleanup, and considers the proximity of a disposal site to an ACEC as part of the evaluation of the site's potential environmental impact. In addition, ACECs are addressed in the MEPA regulations in 301 CMR 11.03(11).

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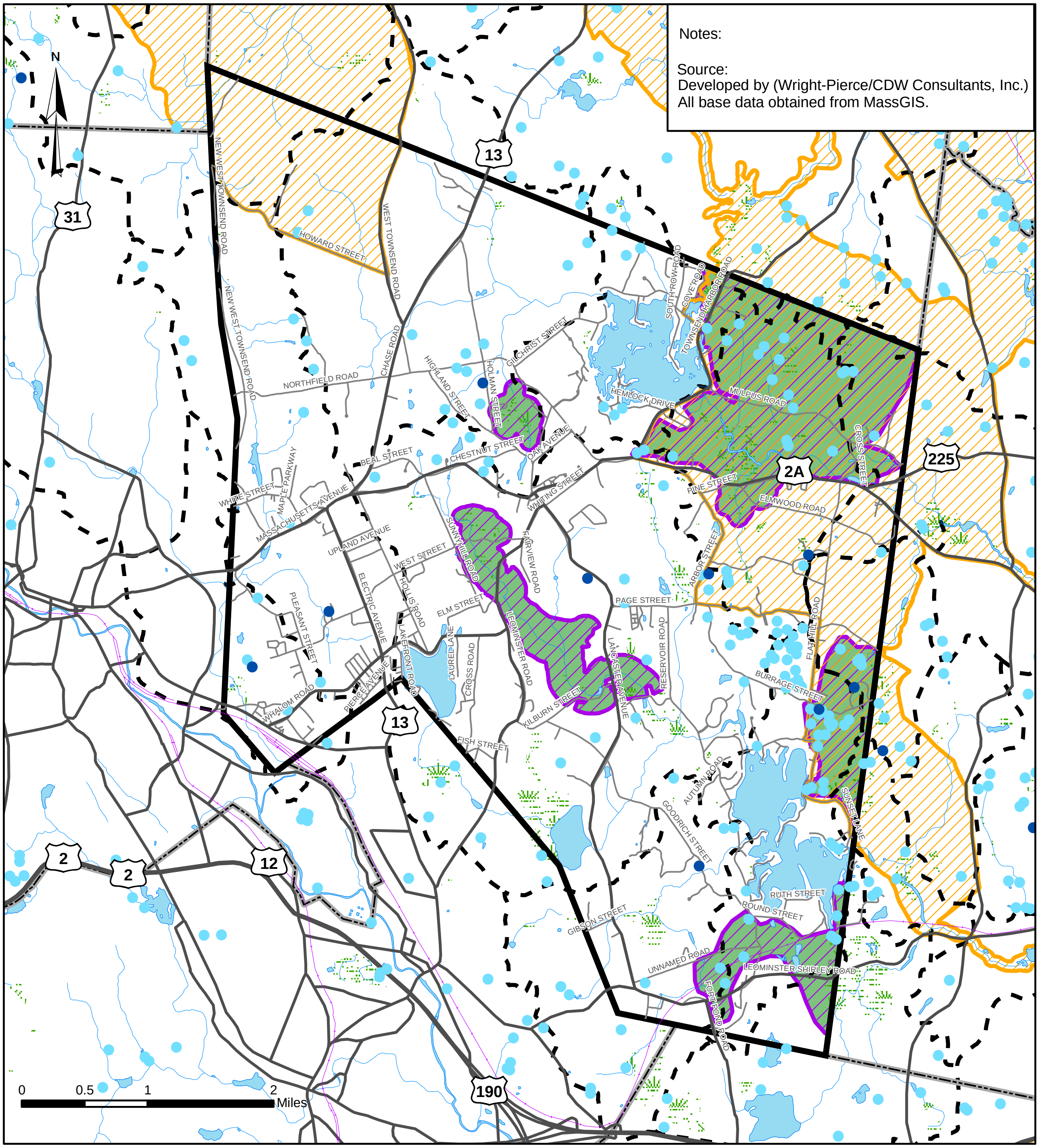
[23] Massachusetts Scenic Landscape Inventory, 1982. Designation of the Squannassit Area of Critical Environmental Concern, December 11, 2002.
[24] ACEC Program, Guide to State Regulations & Programs Regarding ACECs (revised October 2003)
[25] ACEC Program, Guide to State Regulations & Programs Regarding ACECs (revised October 2003)
[*] Glossary

Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.



LEGEND

- NHESP Estimated Habitats for Rare Wildlife
- NHESP Priority Habitats for Rare Species
- Areas of Critical Environmental Concern
- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- Subwatershed Basins
- Major Roads
- Minor Roads
- Rail Roads
- Lakes & Ponds
- Rivers & Streams

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

ENVIRONMENTAL SENSITIVE AREAS

PROJ NO:	10849B
DATE:	Oct. 2006
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FIGURE:
2-5

In the DEP Wetlands Protection Act, ACEC areas designate a higher performance standard for the wetlands resource area known as Bordering Vegetated Wetlands (BVW). Within an ACEC, potential projects are prohibited that would result in the loss of up to 5,000 square feet, in some cases, or up to 500 square feet of BVW (310 CMR 10.55(4)(e)). Under this Act, this CWMP may qualify as a "limited project" in accordance with 310 CMR 10.53 (3)(d), where the issuing authority may issue an Order of Conditions to proceed with work within the BVW in accordance with the following general conditions and any additional conditions set by the Commission:[26]

1. The Commission may require a reasonable alternative route with fewer adverse effects for a local distribution or connecting line not reviewed by the Energy Facilities Siting Council;
2. Best available measures shall be used to minimize adverse effects during construction;
3. The surface vegetation and contours of the area shall be substantially restored; and,
4. All sewer lines shall be constructed to minimize inflow and leakage.

Section 401 Water Quality Certification Program (314 CMR 9.00); and Surface Water Quality Standards (314 CMR 4.00) are other DEP programs that coincide with the Wetlands Protection Act that may have an affect on this CWMP, due to potential filling or discharging to waters within the Squannassit ACEC.

The purpose of Section 401 is to certify that proposed discharges of dredged or fills material, dredging, and dredged material disposal in waters of the United States within the Commonwealth will comply with the Surface Water Quality Standards. The Squannassit waters include Outstanding Resource Waters (ORWs)* such as Pearl Hill Brook, Flurcom Swamp Brook and Mulpus Brook. Proposed activities to these

[26] ACEC Program, Guide to State Regulations & Programs Regarding ACECs (revised October 2003)
[*] Glossary

ORWs will require Section 401 review and certification. In general, discharge to a vernal pool and to areas within 400 feet of public water supply reservoir is prohibited. The Surface Water Quality Standards are intended to meet federal and state goals to restore and maintain the chemical, physical, and biological integrity of surface water. The most antidegradation standards apply to these ORWs.

EOEA Buildout Study

As part of the Smart Growth Initiative – Community Preservation, the EOEA[*] has provided Buildout Maps with projected data for each Massachusetts community that has completed a Master Plan in accordance with Executive Order 418*. The Community Preservation focuses on the quality of life by each community and by each watershed. This Initiative provides tools, technical assistance and outreach to the local decision makers.

Nashua River Watershed 5 Year Action Plan 2003-2007

The Nashua River Watershed Association (NRWA) is an environmental non-profit group which advocates for environmental issues related to the Nashua River. The NRWA and the former Massachusetts Watershed Initiative Nashua Team developed a 5 Year Action Plan 2003-2007. This plan discusses the issues and needs for each community and each sub-basin within the Nashua River Watershed. The issues discussed for Lunenburg are listed in Table 2-4 and resulted from increased development, causing non-point source pollution and the decline of open space.[27]

[*] Glossary
[27] NRWA 5 Year Action Plan 2003-2007

TABLE 2-4
NRWA LUNENBURG ACTION PLAN[28]

ISSUE	RECOMMENDED ACTION	RESPONSIBLE AND POTENTIAL PARTNERS	POTENTIAL FUNDING*
Capacity-building	Implement Phase II Stormwater Program	Town/ DEP/ MRPC/ NRWA	604b/ EO 418/ Planning for Growth
Capacity-building	Acquire GIS capacity and inventory/prioritize parcels	Mass GIS/ Municipalities/ Regional Planning Commissions	EO 418/ Planning for Growth
Open Space	Preserve and protect lands with prime agricultural soils	DFA/ NRCS/ NRWA/ Town	APR/ Community Preservation Act/ DCS Self-help/ DFA
Recreation	Help protect habitat areas identified in the Nashua River watershed habitat assessment report	EO 418/ Planning for Growth	Self help
Recreation	Consider restrictions on horsepower vs speed limits on Lake Shirley	COLAP/ DEM/ DFWELE/ Lake Shirley Improvement Association/ Town	Staff and Volunteer Time
Water Quality	Promote BMPs for new development to mitigate NPS pollution - Stormwater Erosion and Sedimentaion Control	MCD/ MRPC/ NRWA/ Town	604 b/ EO 418/ Staff Time
Water Quality	Restore Lake Shirley	DEM/ Lake Shirley Improvement Committee/ Town	319/ DEM Lakes and Ponds
Water Quantity*	Medium flow stress; therefore, work in Mulpus sub-basin experiencing flow stress to plan for future water supply and habitat protection needs. These are current conditions which are expected to continue to 2020.	DEM/ DEP/ SRF/ Municipalities	604B/ EO 418

[28] Source: http://www.nashuariverwatershed.org/5yr_plan/watershed/overview.html

Hydrologic Assessment Nashua River Watershed, March 2002

A hydrologic assessment was prepared for the Nashua River Watershed on behalf of DEM and EOEA. The planning period for this model is 2000 through 2020. The study stated the future inflow/outflow of wastewater is discharged directly to the mainstem of the streams and rivers. Therefore, wastewater treatment and local groundwater discharge is not expected to significantly help the water balance in any particular sub-area.[29] This study includes the statement: "Sub-areas predicted to be particularly stressed include Falulah Brook, Catacunemaug Brook, Mulpus Brook, and Bower Brook. The predicted increase in losses from these sub-areas is largely due to increased sewerage and/or population growth in Lunenburg and Ayer." Also, the predicted stress levels, based on 7Q10 future flow for the town of Lunenburg, is consistent with other reports which support Mulpus Brook continuation as a medium stress sub-basin; and, Catacunemaug and Falulah Brook sub-basins continue to be low stress basins.

2.2.2.3 Federal Level

The 1972 enactment of the Federal Water Pollution Control Act Amendments, currently referred to as the Clean Water Act (CWA), is the founding act for surface water quality protection for the United States. Regulatory statues are in place to reduce direct pollutant discharges into waterways, to finance wastewater treatment facilities, and to manage polluted runoff. In the 1980s, streamlined funding created improvements to wastewater treatment facilities and EPA-State partnerships were formed. Evolution of CWA programs over the last decade have shifted from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and

[29] Hydrologic Assessment Nashua River Watershed, March 2002

implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of EPA's approach.[30]

2.3 THE BUILT AND HUMAN ENVIRONMENT

2.3.1 Town Government

Lunenburg's government structure includes elected officials and open town meeting. Jurisdiction over local affairs is the responsibility of the elected five member Board of Selectmen. The Selectmen's responsibilities include the appointing of a large number of municipal boards, commissions, and officials. Town government also includes boards with representatives such as the Board of Health, Board of Assessors, School Committee, Park Commissioners, Trust Fund Commissioners, Cemetery Commissioners, Library Trustees, Planning Board and Housing Authority. Other elected officials include the Moderator, Town Clerk, and Constable.

In previous years, the selectmen also served as the Sewer Commissioners. The Town revised their bylaws in 2006, and created a sewer commission. A Sewer Commission which will administer sewer regulations was appointed in September 2006. In addition, the Commission will set rates and fees, subject to approval of the Board of Selectmen, for the Town-owned wastewater infrastructure system.

The Board of Health has jurisdiction over the on-site wastewater disposal systems in Town. The Board maintains the records for these systems, and is responsible for enforcing state and local regulations. The Lunenburg Board of Health works in conjunction with the Nashoba Associated Boards of Health (Nashoba BOH)[31]. Nashoba BOH provides a variety of mandated services for Lunenburg. These include services related to water quality, septic systems, housing code, food service code and alleviation of nuisance conditions.

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[30] Source: http://www.epa.gov/watertrain/cwa/
[31] Acronym

The Lunenburg Water District, which serves a portion of the Town, is separate from the Town government, even though the District is within the boundaries of the Town.

2.3.2 Population

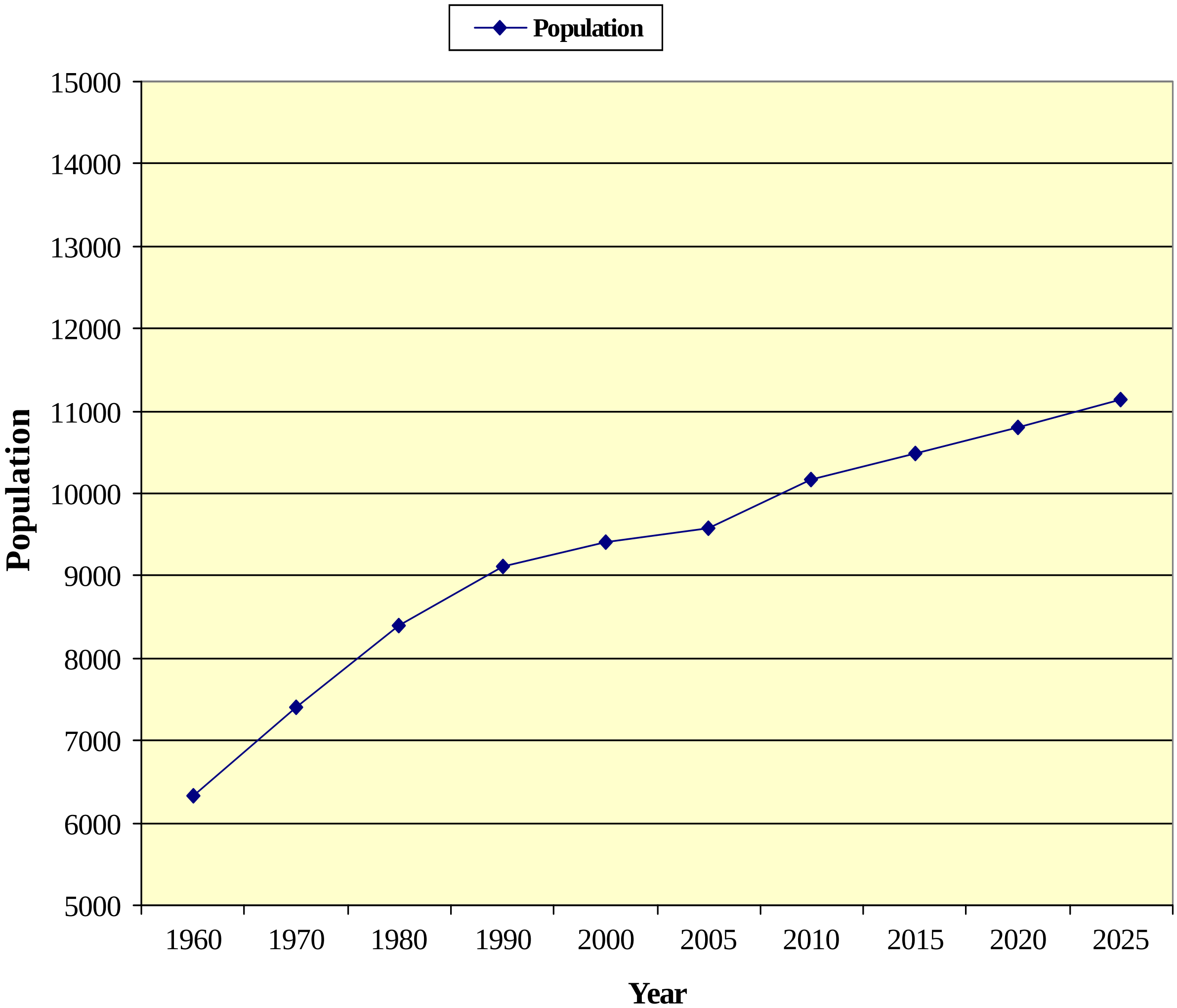
The town of Lunenburg has experienced steady, yet moderate population growth which is in part due to growth in infrastructure, especially transportation routes such as Interstate I-90, I-495, I-95, and state highways Route 128 and Route 2. This population growth is similar to surrounding communities. Lunenburg's historical population, along with EOEA projections for future growth is included below in Table 2-5 and is depicted in Figure 2-6. Additional discussion of population growth is included in Chapter 3.

TABLE 2-5
ESTABLISHED AND PROJECTED POPULATION CHANGES, 1960-2025

YEAR	POPULATION[32]	INCREASE IN POPULATION FROM PREVIOUS DECADE	ANNUAL PERCENTAGE CHANGE
1950	3,906	77.9%	
1960	6,334	62.1%	10
1970	7,419	17.1%	3.1
1980	8,405	13.3%	2.4
1990	9,117	8.5%	1.5
2000	9,401	3.1%	0.5
2004[33]	9,554	1.6%	0.2
2025[34]	11,133	-	-
Buildout[35]	22,318	-	-

[32] Montachussett Region Comprehensive Economic Development Strategy Five-Year Annual Report, Evaluation and Work Plan, September 8, 2005.
[33] Lunenburg Town Report, 2005
[34]Source:http://commpres.env.state.ma.us/community/cmty_profile.asp?communityID=162&communityName=Lunenburg&communityCode=lnbg&communityType (EOEA Buildout Analysis Summary)
[35]Source:http://commpres.env.state.ma.us/community/cmty_profile.asp?communityID=162&communityName=Lunenburg&communityCode=lnbg&communityType (EOEA Buildout Analysis Summary)

FIGURE 2-6
ESTABLISHED AND EOEA PROJECTED POPULATION CHANGES 1960-2025



2.3.2.1 Demographic Characteristics

The 2000 US Census concluded in Lunenburg there were 9,401 people, 3,555 households, and 2,668 families residing in the town. The population density was 355.8/mi². There were 3,668 housing units at an average density of 138.8/mi². Of the 3,555 households, 34.9 percent had children under the age of 18 living with them, 63.6 percent were married couples living together, 8.7 percent had a female householder with no husband present, and 24.5 percent were non-families. The average household size was 2.66 while the average family size was 3.08.

The median income for a household in the Town was $56,812. The median income for a family was $63,981. The per capita income in the Town was $26,986. About 3.3 percent of families and 4.1 percent of the population were below the poverty line, including 3.7 percent of those under age 18 and 1.4 percent of those ages 65 or over.

Median Income Distribution

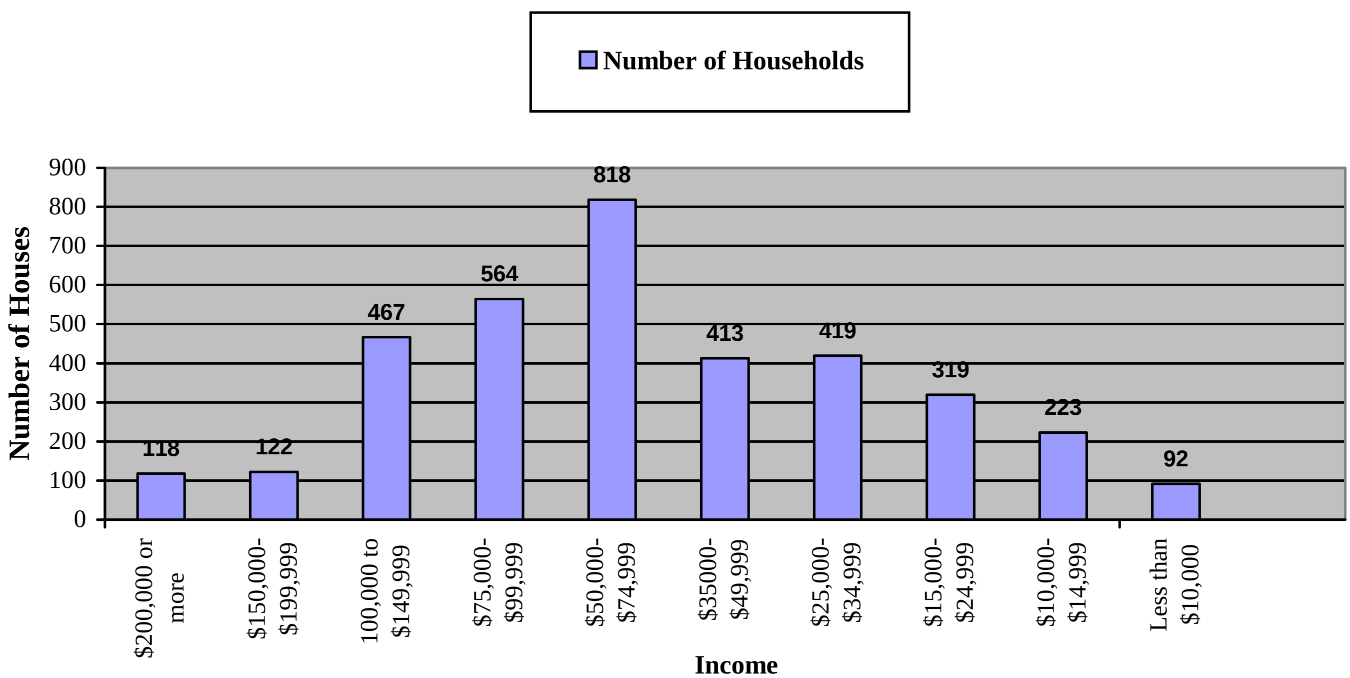
Lunenburg's household income distribution, as reported in the 2000 U.S. Census is presented in Table 2-6 and graphically depicted in Figure 2-7. The median household income for 2000 was $56,812.

TABLE 2-6
LUNENBURG INCOME DISTRIBUTION AND PERCENTAGES

HOUSEHOLD INCOME - 1999	NUMBER OF HOUSEHOLDS	PERCENT	CUMULATIVE PERCENT
$200,000 or more	118	3.3	3.3
$150,000 to $199,999	122	3.4	7.7
$100,000 to $149,000	467	13.1	20.8
$75,000 to $99,999	564	15.9	36.7
$50,000 to $74,000	818	23.0	59.7
$35,000 to $49,000	413	11.6	71.3
$25,000 to $34,999	419	11.8	83.1
$15,000 to $24,999	319	9.0	92.1
$10,000 to $14,999	223	6.3	98.4
Less than $10,000	92	2.6	100
Median household income	$56,812	-	-
Total	**3555**		

Age Distribution

FIGURE 2-7
LUNENBURG INCOME DISTRIBUTION



Age distribution in Lunenburg for 1990 and 2000[36] is presented in Table 2-7.

TABLE 2-7
AGE DISTRIBUTION FOR YEARS 1990 AND 2000

Age Range	**1990**		**2000**	
	Population	Percent of Population	Population	Percent of Population
Under 10 years	1275	14.0	1226	13
10 to 14 years	649	7.1	771	8.2
15 to 19 years	602	6.6	634	6.7
20 to 24 years	525	5.8	320	3.4
25 to 34 years	1382	15.2	1004	10.7
35 to 44 years	1646	18.0	1793	19.1
45 to 54 years	1138	12.4	1629	17.3
55 to 59 years	433	4.7	519	5.5
60 to 64 years	397	4.4	376	4
65 to 74 years	686	7.5	635	6.8
75 to 84 years	313	3.4	387	4.1
84 years and older	71	0.8	107	1.1
Total Population	**9117**		**9401**	
Median age (years)				39.4

2.3.3 Economy

The majority of Lunenburg's employed residents work within a ten mile radius of the Town. The largest sources of employment in Lunenburg are wholesale and retail trade, service industries, and Town Government.[37] The labor and employment rates are included in Table 2-8.

36 1990 and 2000 US Census
37 Lunenburg Master Plan, April 2002.

TABLE 2-8
LABOR FORCE, EMPLOYMENT AND UNEMPLOYMENT IN LUNENBURG[38]

Year	Labor Force	Employed	Unemployed	Unemployment Rate
Average through August 2006				
2006	**5,277**	**4,998**	**279**	**5.3**
Annual Average				
Year	**Labor Force**	**Employed**	**Unemployed**	**Unemployment Rate**
2005	5,279	5,012	267	5.1
2004	5,386	5,077	309	5.7
2003	5,408	5,075	333	6.2
2002	5,383	5,076	307	5.7
2001	5,272	5,087	185	3.5
2000	5,231	5,087	144	2.8
1999	5,131	4,955	176	3.4
1998	5,092	4,937	155	3
1997	5,224	5,007	217	4.2
1996	5,113	4,877	236	4.6
1995	5,120	4,861	259	5.1
1994	5,297	5,004	293	5.5
1993	5,288	4,923	365	6.9
1992	5,176	4,797	379	7.3
1991	5,145	4,702	443	8.6
1990	5,109	4,815	294	5.8

2.3.4 Land Use

The major land uses within the town of Lunenburg are included in Table 2-9 and shown in Figure 2-8. All statistics are based on the Lunenburg Assessor records provided for this CWMP.

[38] Source: www.Mass.gov

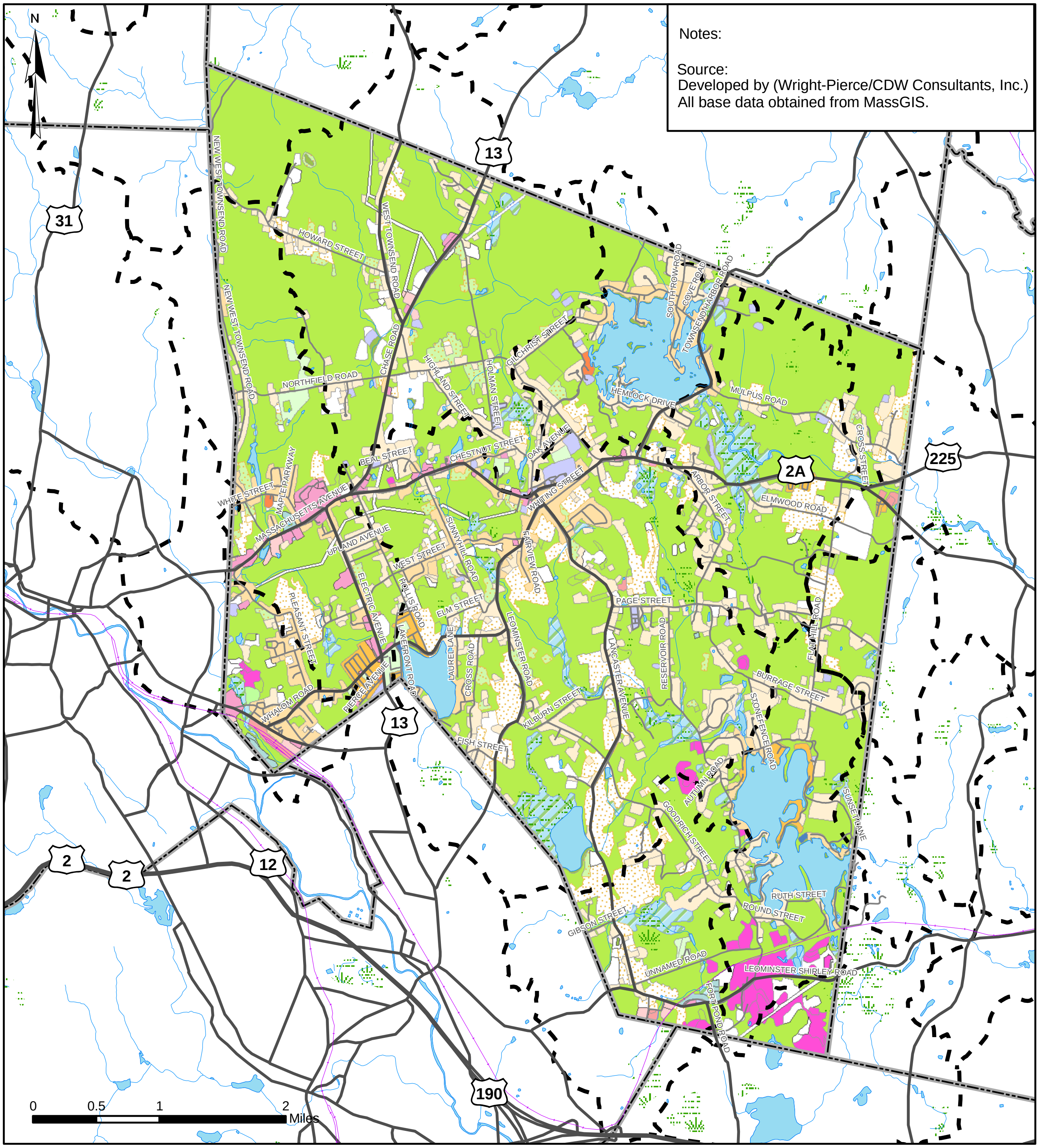
TABLE 2-9
LAND USE

Land Classification	Percent of Total Area In Town	Total Acres	Acres Available for Development [39]	Acres Undeveloped
Mixed-Use	10.34	1,945.16	-	-
Residential	53.36	10,035.77	1,648.67	1,970.64
Town Owned	15.40	2,895.57	-	-
Commercial	5.01	942.76	253.53	276.71
Industrial	6.60	1,241.92	8.28	8.28
Forest, Chapter 61	0.55	104.27	-	-
Agriculture, Chapter 61A	2.08	391.07	-	-
Recreational Land, Chapter 61B	1.54	290.27	-	-
Open Space (underwater land – not public owned)	1.74	327.00	-	-
State Owned	2.67	501.68	-	-
Private Schools/Churches	0.70	130.72	-	-
Totals	100.00	18,806.19	1,910.48	2,255.63

[39] Acres Available for Development does not include subdivision of existing developed lots.

Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.



LEGEND

Major Roads	Wetland	Residential (>1/2 acre lots)
Minor Roads	Mining	Commerical
Rail Roads	Open Land	Industrial
Subwatershed Basins	Participation Recreation	Urban Open
Lakes & Ponds	Spectator Recreation	Transportation
Rivers & Streams	Water Based Recreation	Waste Disposal
Cropland	Residential (Multi Family)	Woody Perrenial
Pasture	Residential (< 1/4 acre lots)	
Forest	Residential (1/4-1/2 acre lots)	

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

LAND USE

PROJ NO: 10849B
DATE: Oct. 2006
SCALE:

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-8

2.3.4.1 Chapter 61 Land

Chapter 61 lands are privately held properties governed for tax purposes by Massachusetts General Law (MGL) Chapter 61. Chapter 61, 61A, and 61B is designed to encourage the preservation and enhancement of the Commonwealth's forests, valuable farmland and recreational open space. It offers significant local tax benefits to property owners willing to make a long-term commitment to forestry, farming, and preserving land for outdoor activities. In exchange for these benefits, the city or town in which the land is located is given the right to recover some of the tax benefits afforded the owner when the land is removed from classification and an option to purchase the property should the land be sold or used for non classified uses.

The city or town has an option to purchase any classified land whenever the owner plans to sell or convert it to a residential, commercial or industrial use. The owner must notify by certified mail the mayor or city council or the selectmen, assessors, planning board and conservation commission of the city or town of any intention to sell or convert the land for those uses. If the owner plans to sell the land, the city or town has the right to match a bona fide offer to purchase it. If the owner plans to convert it, the city or town has the right to purchase it at it's fair market value, which is determined by an impartial appraisal. The city or town may also assign its option to a non profit, conservation organization. The owner cannot sell or convert the land until at least 120 days after the mailing of the required notices or until the owner has been notified in writing that the option will not be exercised, whichever is earlier.

The Town has a demonstrated history of purchasing land under Chapter 61. For example, the Woodruff parcel that lies along Leominster Road along one of the phased sewer projects was purchased and placed under assessment as Chapter 61A land, thus avoiding conversion of the property into extensive development along the sewered Leominster Road and thus preserving open space.

2.3.5 Planning

2.3.5.1 Master Plan

The Town of Lunenburg has developed a growth management strategy through master planning by developing planning goals and policies. The 1989 Growth Management Plan Planning Goals and Policies were adopted by the Planning Board and predicated on the Town remaining unsewered. In more recent years, the Town has revised the planning goals and policies to reflect the growing visions of the Town. The intent of the revisions was to achieve several of the Town's goals such as 'to encourage economic development' and 'to protect natural resources'.[40] The stated vision of the Master Plan for 2007 is "A fiscally responsible Town with an active community lifestyle, working to preserve the character of the Town and serve its Citizens with appropriate municipal services, housed in suitable municipal facilities." In addition, the following planning goals were established for the 2002 Master Plan:

- To preserve the rural residential characteristics of the Town;
- To promote more efficient land use;
- To encourage economic development in the Town;
- To protect natural resources; and,
- To provide quality municipal services for the residents of the Town.

In particular, this CWMP will incorporate the following goals and policies*:*

Goal - *To Preserve the Rural Residential Characteristics of the Town*

Policy: *Preserve the aesthetic quality of the Town*.

Where viable and in accordance to engineering practices and regulations, this CWMP will recommend proposed infrastructure site work to match existing infrastructure that is aesthetically acceptable to the Town. The CWMP will also address the impact of development on character and view sheds.

[40] Lunenburg Master Plan, April 2002

Goal – *To Protect Natural Resources*

Policy: *Protect critical environmental areas in the Town.*

The intent of this CWMP is to provide protection to the environment in the design of wastewater improvements for the Town.

Goal – *To Promote More Efficient Land Use.*

Policy: *Protect critical environmental areas in the Town.*

The intent of this CWMP is to provide protection to the environment in the design of wastewater improvements for the Town.

2.3.5.2 Chapter 40B/40R Planning

Massachusetts Law Chapter 40B enables local Zoning Boards of Appeals (ZBAs)[*] to approve affordable housing developments under flexible rules if at least 20 percent of the units have long-term affordability restrictions. Its goal is to encourage the production of at least 10 percent of the housing units to be affordable housing in all communities throughout the Commonwealth.

Chapter 40R provides financial rewards to communities that adopt Smart Growth zoning districts allowing high density residential development. Recently, the Town of Lunenburg has adopted a Smart Growth overlay district in the area of the former Tri-Town Drive-In movie theatre located in the southwestern portion of the Town. An Environmental Notification Form (ENF) under the Massachusetts Environmental Protection Act was filed for the redevelopment of the Tri-Town Drive-In. The development proposes to add 204 apartment-type units, which will include Chapter 40B housing to bring Lunenburg closer to the long-term affordable housing goals.

[*] Glossary

2.3.5.3 Developments New and Proposed in Lunenburg

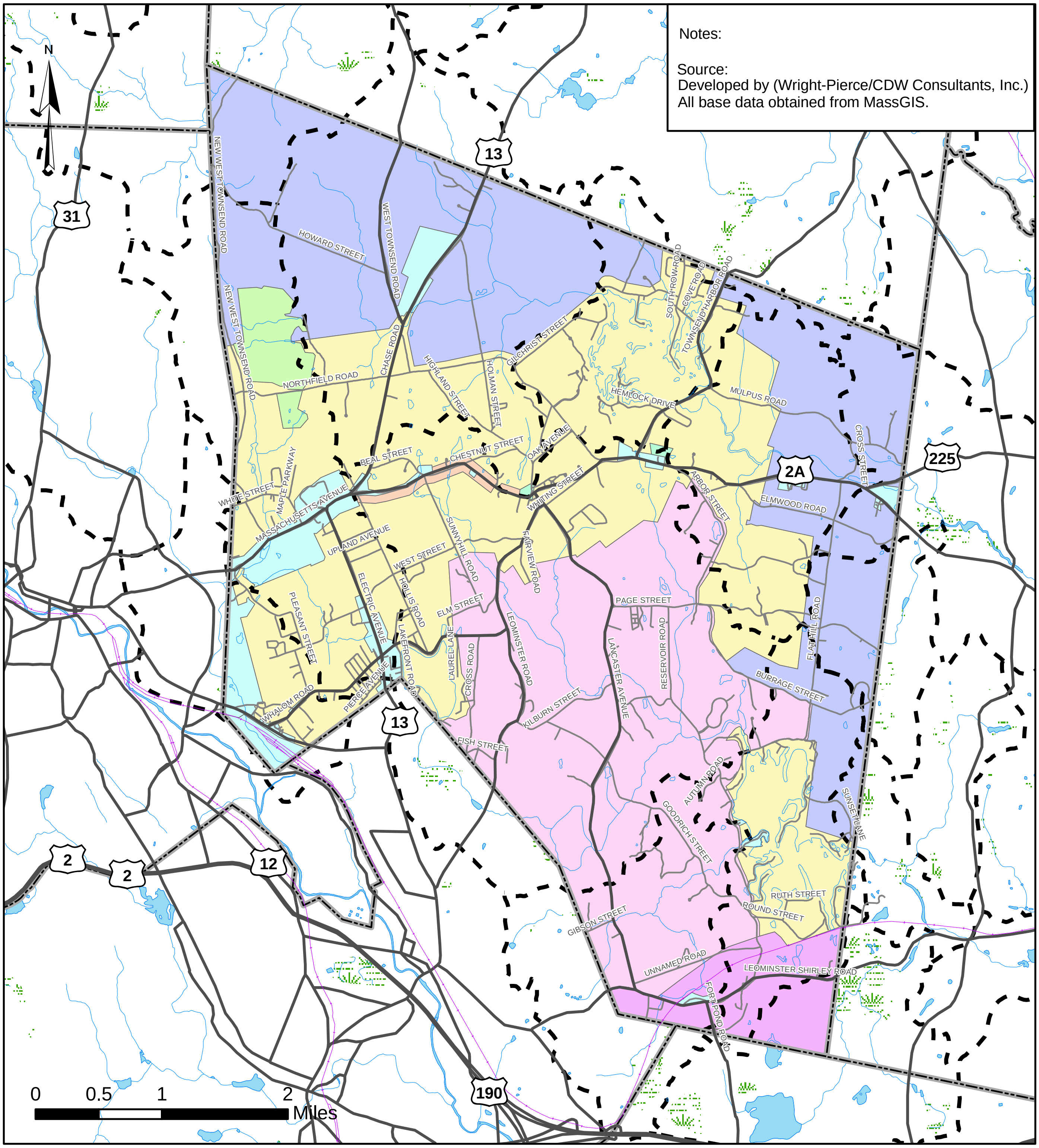
The following Table 2-10 lists the new and proposed developments that were recorded at the Planning Board through August 2006.

2.3.6 Zoning

The Town of Lunenburg is divided into 12 zoning districts, five of which are overlay districts (i.e., Smart Growth, Flood Plain, Water Supply Protection, Route 2A and Lake Whalom). The zoning districts and statistical coverage are shown on Figure 2-9. The Town's zoning districts are described in Table 2-11

TABLE 2-10
NEW AND PROPOSED DEVELOPMENTS

Project Name	Location	Home Type	# Units	Units over 55	Project Status
Standard Subdivisions					
Benjamin Hill	69 Mass Ave	single family	2		dormant
Emerald Place At Lake Whalom	10 Lakefront	town house & garden-style (1 & 2 bdrm)	240	38	in review.
Highfield Village	361 Mass Ave	single family	66		in review
Lena Lane	Lancaster Ave/Gibson St	single family	4		in review
Oak Haven Estates	Arbor St	single family	6		dormant
Sequoia Drive	341 Howard St	single family	8		complete
Stone Farm Estates	748 Mass Ave	condo-type		58	in construction
Villages at Flat Hill	Flat Hill Rd	single family	45		structures completed/ road mitigation incomplete
Whispering Pines	Beal Street	single family	19		in review
White Tail Crossing	209 & 331 Burrage St	single family	16		in review
Whites Woods, Ph. 1	Mass Ave & White St	single family	18		complete
Whites Woods, Ph 2	Mass Ave & White St	condo-type		10	complete
Whites Woods, Ph 3	Mass Ave & White St	condo-type		18	in construction
40B Projects					
Lunenburg Estates	1229 Mass Ave	town houses	64		Approved (construction period not known)
Hollis Hills	Hollis Rd &t West St	condo-type (3-brm)	146		Proposed
Lunenburg Village	250 WhalomRd	condo-type (3-brm)	120		Proposed
40R Projects					
Tri Town Landing	Youngs Rd	apartments 10% 3 bdrm 70% 2 bdrm 20% 1 bdrm	204		proposed



LEGEND

- Major Roads
- Minor Roads
- Rail Roads
- Subwatershed Basins
- Lakes & Ponds
- Rivers & Streams
- Commercial (C)
- Limited Business/Residential (LB/R)
- Outlying District (O)
- Office Park/Industrial (OP/I)
- Recreation (R)
- Residence A (RA)
- Residence B (RB)
- Retail Commercial (RC)

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

ZONING

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-9

TABLE 2-11
ZONING DISTRICTS

Zoning Districts	Min. Lot Size (sf)	Total Area (acres)	Frontage (ft)	Principal Allowable Uses
Residence A	40,000	7,756.68	100	-Single or Multi-Residential Dwellings -Agricultural, Raising livestock for accessory use
Residence B	80,000	3,918,90	100	
Outlying	40,000	5,412.34	100	
Limited Business / Residential	See Note 1.	146.29	100	-One or Two-Family Dwellings -Single or Multi-Residential Dwellings -Assisted Living & Continuing Care Facilities -Service/Repair Shops -Retail (i.e., antiques, flowers, gifts, art/crafts) -Bed & Breakfast, Inns & Function Facilities, Catering Services -Agricultural, Raising livestock for accessory use -Kennel
Commercial	10,000	894.10	100	-Commercial -Motel -Medical -Storage / Distribution / Showrooms -Kennel -Assisted Living & Continuing Care Facilities
Retail Commercial	10,000	6.71	100	-Community / Public Administrative Buildings -Retail / Service Establishments -Restaurants / Food Establishments -Parking Areas / Garages -Agricultural -Business / Professional Office or Agency Bank or Financial Institution
Office Park and Industrial	See Note 2.	735.79	150	-Office Buildings / Parks, Industrial Parks -Research / Manufacturing -Enclosed Storage / Distribution -Parking Areas / Garages

Zoning Districts	Min. Lot Size (sf)	Total Area (acres)	Frontage (ft)	Principal Allowable Uses
Recreation	Not applicable			-Commercial outdoor recreation
Smart Growth (see Note 3)	Not applicable			*Refer to underlying district uses.*
Flood Plain (see Note 3)	Not applicable			*Refer to underlying district uses.* -Agricultural / Forestry / Conservation / Wildlife Management -Outdoor Recreation
Water Supply Protection (see Note 3)	Not applicable			*Refer to underlying district uses.* -Agricultural / Forestry / Conservation / Wildlife Management -Outdoor Recreation
Route 2A (see Note 3)	Not applicable			*Refer to underlying district uses.*
Lake Whalom (see Note 3)	Not applicable			*Refer to underlying district uses.*

Note 1: Lot size is dependent on use, refer to Protective Bylaw.
Note 2: Lot size is based on the total areas of proposed development, refer to Protective Bylaw.
Note 3: These are overlay districts, refer to Protective Bylaw for Permissible, Conditional, and Prohibitive Uses.

2.3.7 Buildout Analysis

The EOEA prepared a series of estimates to determine the future buildout of Massachusetts cities and towns. The community data profiles prepared by EOEA and based on statistics that analyze available land in each zoning district. Projections were made for additional housing units and non-residential land development based on available land. The EOEA Buildout Analysis for Lunenburg was completed in 2001, and utilized the 2000 U.S. Census.[41] The Demographic projections are included in Table 2-12, and the buildout impacts are included in Table 2-13. Although the buildout projections and impacts are based on available land and its zoning, this is not necessarily desirable or considered realistic due to available resources and restrictions. Buildout impacts are considered a worst-case scenario. The projections listed in Tables 2-12 and 2-13 are based on the EOEA study. Additional discussion of buildout is contained in Chapter 3.

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[41] EOEA Montachusett Region: Town of Lunenburg Buildout Analysis Summary (EOEA website), http://commpres.env.state.ma.us/community/cmty_profile.asp?regionID=MONT&regionName=Montachusett&communityID=162&communityName=Lunenburg&communityType=&communityCode=lnbg

TABLE 2-12
LUNENBURG DEMOGRAPHIC PROJECTIONS

Residents	
1990	9,117
2000 Census	9,401
2025 Projection (EOEA)	11,133
Full Buildout	22,318
Residential Units	
1990	3,252
2000 Census	3,668
Full Buildout	8,713
Water Use (gallons/day)	
2000 Census	515,337
Full Buildout	2,566,783

TABLE 2-13
BUILDOUT IMPACTS

Additional Residents	12,917
Additional Residential Units	5,045
Additional Developable Land Area (sq ft)	289,418,383
Additional Developable Land Area (acres)	6,644
Additional Commercial/Industrial Buildable Floor Area (sq ft)	14,435,585
Additional Water Demand at Buildout (gallons/day)	2,051,446
Residential	968,777
Commercial and Industrial	1,082,669
Additional Solid Waste (tons/yr)	5,989
Non-Recyclable	4,712
Recyclable	1,277
Additional Roadway at Buildout (miles)	49

2.3.8 Open Space

Approximately 8.5 percent of the Town's total land is Open Space-Conservation Land. These areas are shown in Figure 2-10. Table 2-14 identifies Town and State Conservation Land.[42]

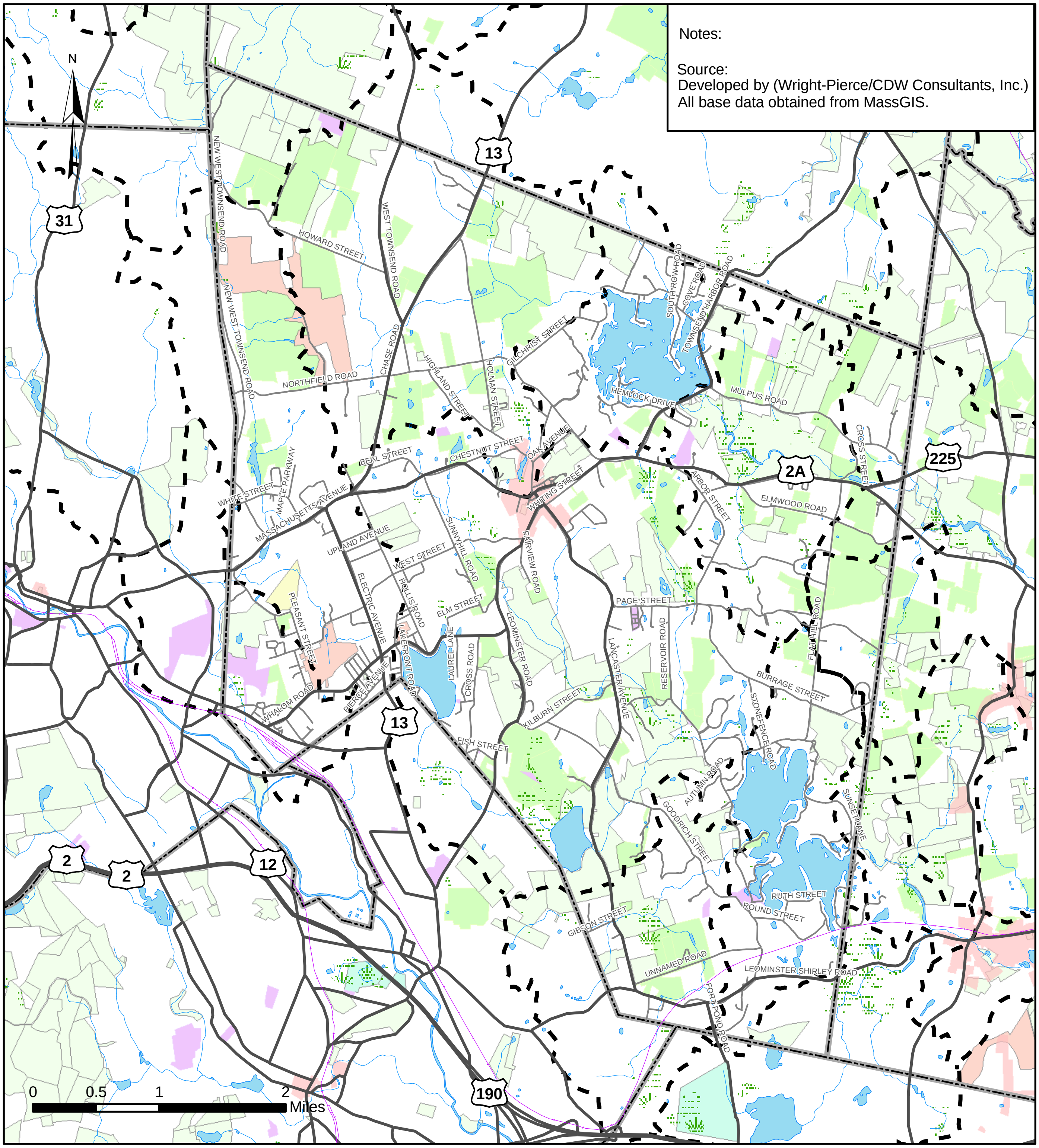
TABLE 2-14
TOWN AND STATE CONSERVATION LAND

	LOCATION	**ACREAGE**
Town Land	NW Townsend Road	180.00
	Howard Street	15.00
	West Townsend Road	35.00
	Chase Road	267.39
	Townsend Harbor Road	44.50
	Northfield Road	20.00
	Mulpus Road	215.24
	Mulpus Road	66.50
	Chase Road	36.38
	Massachusetts Avenue	283.98
	Elmwood Road	24.25
	Leominster Road	9.04
	Burrage Street	74.00
	Reservoir Road	72.50
	Page Street	7.50
	Page Street	29.49
	Pleasant Street	78.84
	Lancaster Avenue	17.00
State Land	Townsend Road	127.48
	Total Conservation Land	**1,604.09**

2.3.7 Historic Areas

The Town created a 102-acre Historic District that includes many buildings within the Town Center. Table 2-15 lists the structures and sites within the Historic District.[43]

[42] Lunenburg Master Plan, April 2002.
[43] Lunenburg Master Plan, April 2002.



Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.

LEGEND

- Chapter 61 Lands

Protected & Recreational Open Space

Level of Protection

- L
- N
- P
- T
- X
- State Register of Historic Places
- Subwatershed Basins
- Major Roads
- Minor Roads
- Rail Roads
- Lakes & Ponds
- Rivers & Streams

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

CONSERVATION & STATE REGISTERED HISTORIC LAND

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-10

TABLE 2-15
STRUCTURE AND SITES IN THE HISTORIC DISTRICTS

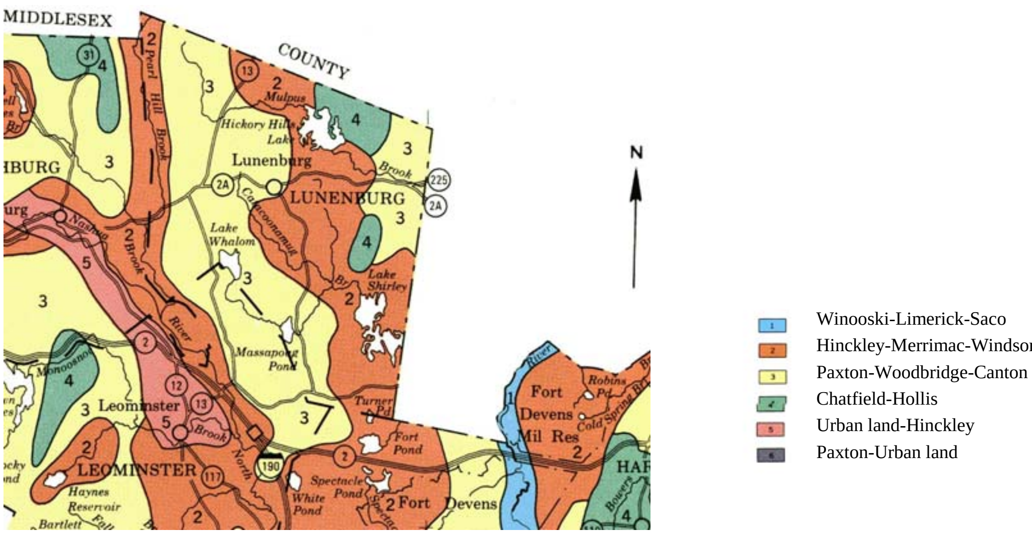
Name	Address
Bellows House	Memorial Drive
Putnam Store	Town Center
Town Hall	17 Main Street
Congregational Church	Town Center
Jones House	42 Main Street
Methodist Church	50 Main Street
John Howard House	58 Main Street
Wooldredge House	76 Main Street
Locke House	94 Main Street
Elwin Marshall House	91 Main Street
Marshall Cottage	3 Oak Avenue
Barney House	78 Oak Avenue
Gilchrest House	13-15 Oak Avenue
Town Pond	Highland Street
Passios House	72 Highland Street
1730 House	795 Massachusetts Avenue
Hildreth House	876 Massachusetts Avenue
Jewett House	920 Massachusetts Avenue
Franklin S. Francis House	944 Massachusetts Avenue
Susan Brown House	950 Massachusetts Avenue
Ritter Memorial Library	960 Massachusetts Avenue
Simon Heywood House	993 Massachusetts Avenue.
Brooks House	1033 Massachusetts Avenue
Lane House	1091 Massachusetts Avenue.
A.K. Francis House	3 Lancaster Avenue
Richardson House	19 Lancaster Avenue
No.1 School House	23 Lancaster Avenue
Benjamin Whiting House	43 Lancaster Avenue
William Harrington house	53 Lancaster Avenue
Cushing House	73 Lancaster Avenue
Elmdale House	125 Lancaster Avenue
Cunningham House	86 Lancaster Avenue
Bandstand	Lower Common
Stone Watering Trough	Lower Common
Clifton House	53 Whiting Street

2.4 Natural Environmental Systems

2.4.1 Soils

The Natural Resources Conservation Service (NRCS) published the Soil Survey of Worcester County, Massachusetts: Northern Part in 1985. There are four major soil types found in Lunenburg, Paxton-Woodbridge-Canton, Chatfield Hollis, Hinchley-Merrimac Windsor, and Urban as shown in Figure 2-11. The soil survey has been incorporated into the MassGIS database and was utilized to create Figure 2-12, Soils, and Figure 2-13, Surficial Geology. The soil types shown on Figure 2-12 are listed in Section 3, including a description of the soil drainage qualities.

FIGURE 2-11
MAJOR SOIL TYPES

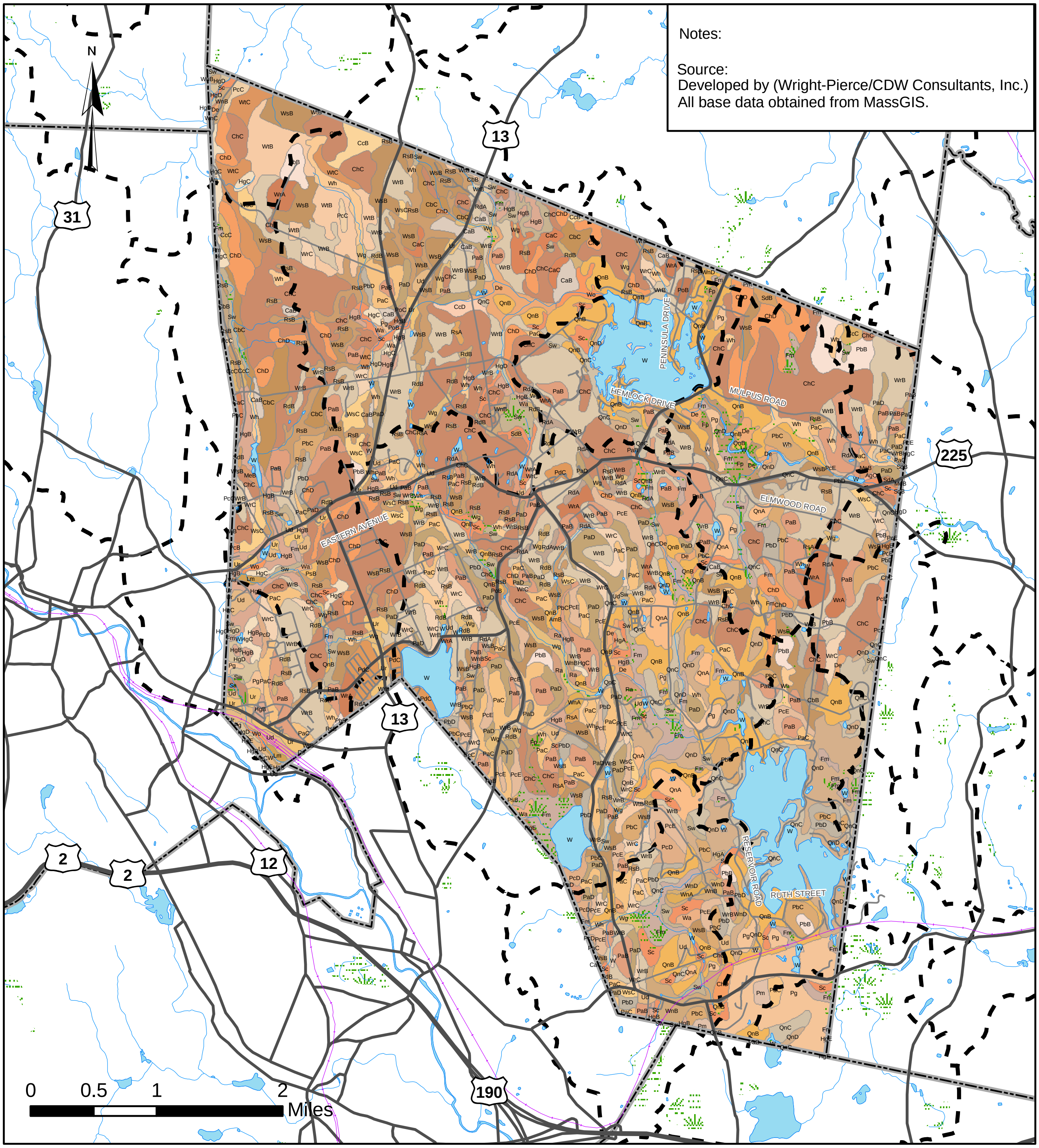


Paxton-Woodbridge-Canton

This soil group is formed in glacial till and covers a major portion of the Town. It runs in a band from the northwest-central boundary to the south-central portion of the Town. It is also found in a band from the northeastern corner and along the eastern-central boundary of the Town. Paxton soils are well drained, gently sloping to steep, and have slow to very slow permeability. Woodbridge soils are moderately well drained, nearly level to sloping, with slow to very slow permeability, and is often found on the top of hills and drumlins. Canton soils are well drained, gently sloping to steep and have

Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.



LEGEND

- Subwatershed Basins
- Major Roads
- Minor Roads
- Rail Roads
- Lakes & Ponds
- Rivers & Streams

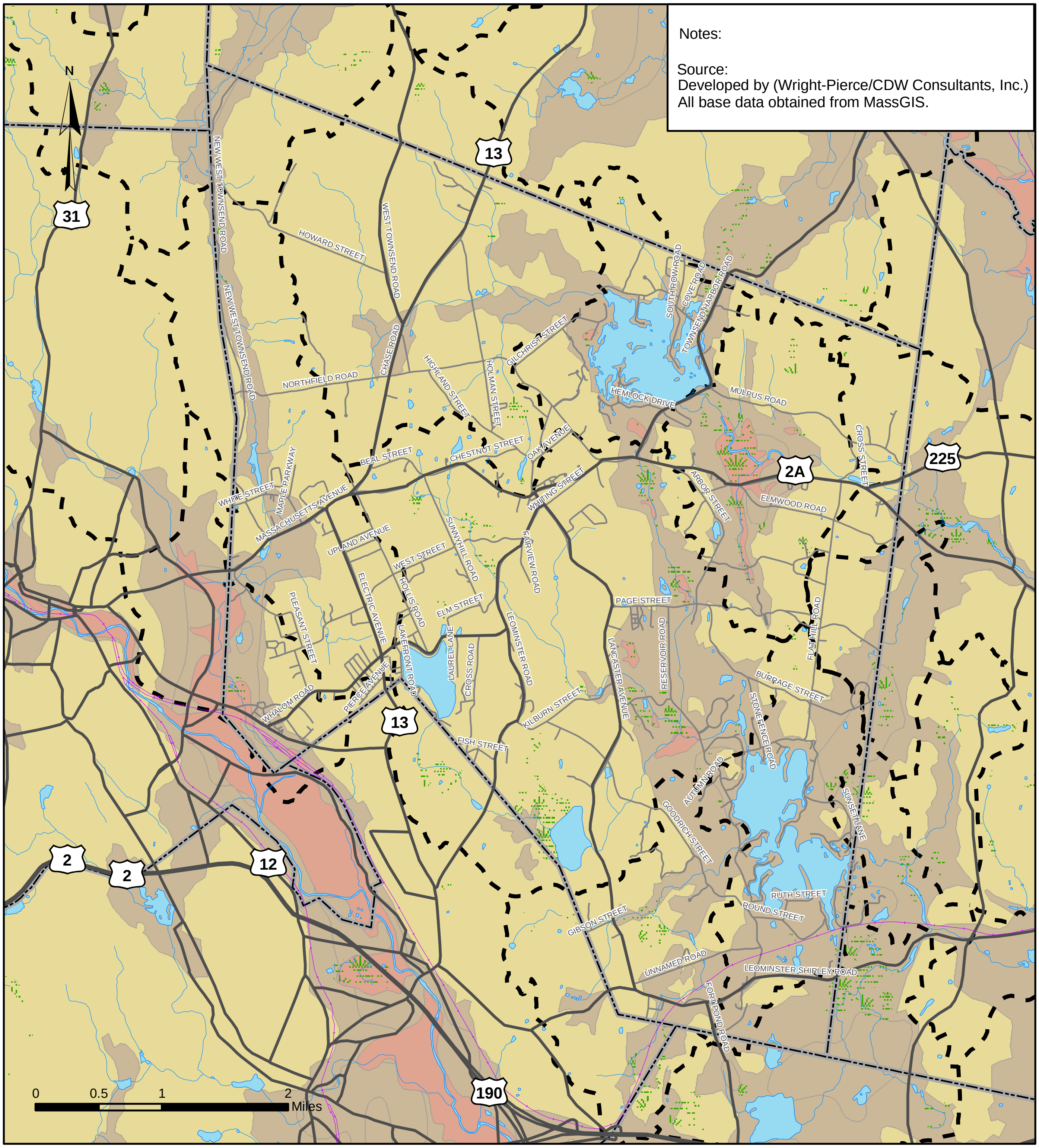
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

SOIL TYPES

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-12



Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.

LEGEND

- Sand and Gravel
- Till or Bedrock
- Floodplain Alluvium
- Subwatershed Basins
- Major Roads
- Minor Roads
- Rail Roads
- Lakes & Ponds
- Rivers & Streams

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

SURFICIAL GEOLOGY

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
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CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-13

moderately-rapid to rapid permeability. The minor soils are poorly drained Ridgebury and very poorly drained Whitman and Swansea, which are found in depressions and low-lying areas.

Chatfield-Hollis

This soil group is formed in glacial till. It is found in two smaller isolated areas north and east of Hickory Hills Lake and north of Lake Shirley. The soils in both the Chatfield and Hollis groups are moderate to moderately-rapid permeability. Chatfield is found on the lower slopes of ridges and Hollis soils are found on the upper slopes. The minor soils are well drained Canton and very poorly drained Swansea, Freetown, and Whitman soils. The minor Canton soils are found on the lower slopes, and other minor soils are found in depressions or low-lying areas.

Hinckley-Merrimac-Windsor

The Hinckley-Merrimac-Windsor soil type is found along the western boundary of the Town and runs in a band from the north-central boundary to the southeastern portion of the Town. The Hinckley soils are generally deep and level, have rapid permeability in the subsoil and very-rapid permeability in the substratum. Hinckley soils typically have a loamy surface layer underlain by stratified sand and gravel. Merrimac soils are nearly level to moderately steep, are somewhat excessively drained, and have moderately rapid or rapid permeability. Typically, the Merrimac soils consist of two feet of loamy material over sand and gravel. Windsor soils are generally sandy, excessively drained and are in the lower areas of the outwash plains; they range from nearly level to moderately steep; and, they have rapid to very rapid permeability.

Urban

Soil texture and other soil properties vary significantly within short distances on urban landscapes. This variation is caused by the movement and mixing of soil materials during construction activities or changes in any of the soil-forming factors. The combinations of different textures may improve or limit the soil for a specific use.

2.4.2 Topography & Hydrology

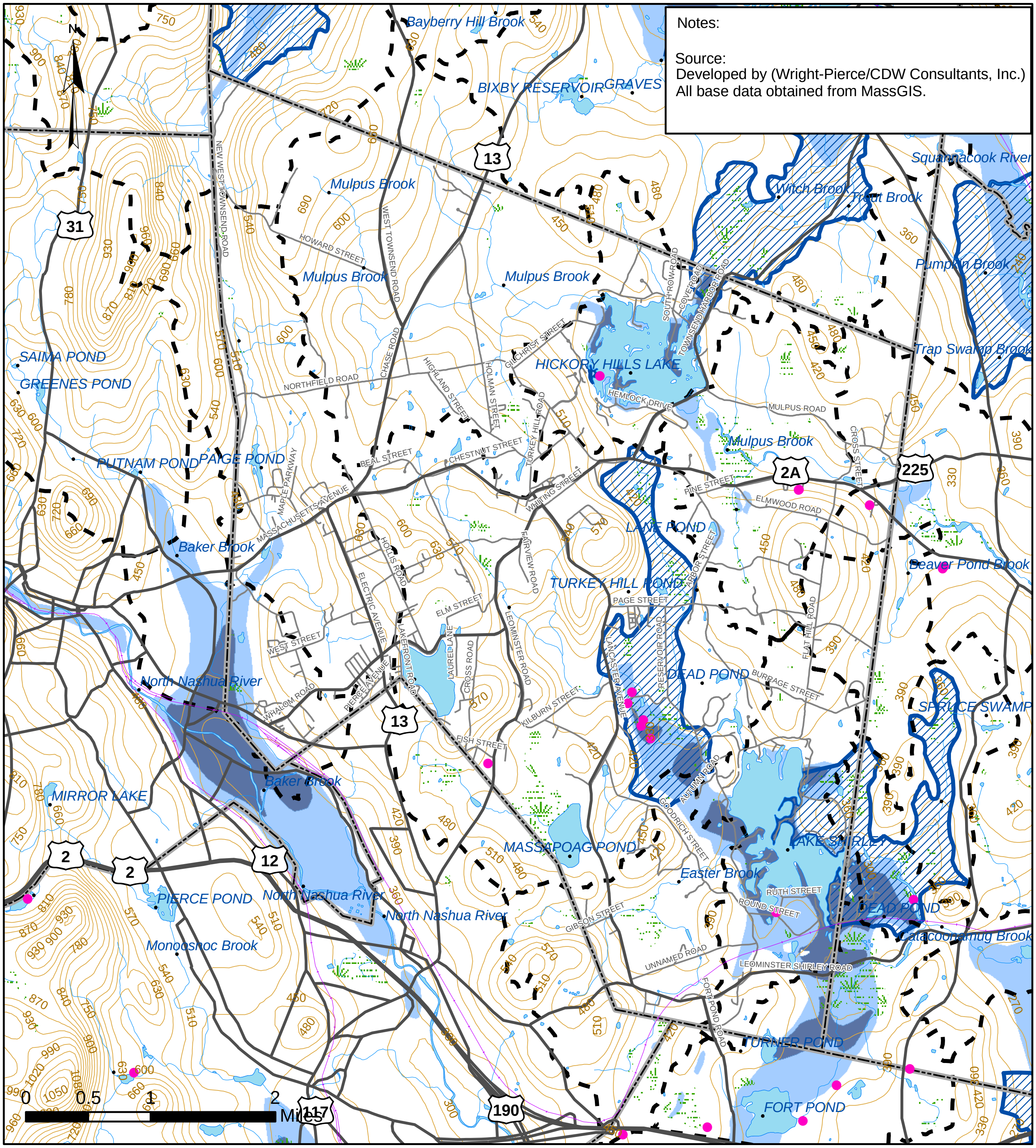
2.4.2.1 Topography

The topography of Lunenburg, as shown in Figure 2-14, is predominantly hilly terrain, with primarily gradual elevation changes. However, steep slopes are found in the northeast and central portions of Town. The majority of the Town slopes west to east, with elevations ranging from approximately 700 feet above sea level in the northwest portion of the Town to less than 330 feet above sea level in the southeastern portion of the Town in the area of Lake Shirley.

There are four significant water bodies that largely influence surface drainage patterns. These are Hickory Hills Lake, Lake Whalom, Massapoag Pond, and Lake Shirley. Minor waterbodies that influence drainage include: Pearl Hill Brook and Paige Pond, Mulpus Brook, the Turkey Hill Pond area, and Easter Brook. Typically, wetlands characterize the low-lying areas of the Town.

2.4.2.2 Surficial Geology

The surficial geology of the Town is predominantly sand and gravel, and till or bedrock. The Town's surficial geology is somewhat divided between east and west. The western portion of the Town is predominantly till or bedrock with the exception of the following areas consisting of sand and gravel: Pearl Hill Brook/Paige Lake area that extends along the western boundary; an isolated pocket north of Northfield Road at the intersection of Chase Road; and, areas in the vicinity of Hickory Hills Lake. The sand and gravel deposits, within the eastern portion of the Town, tend to coincide with the aquifers and lakes with a depth to 50 feet. There is a sand and gravel band that extends from the north central area of Hickory Hills through the east central portion of Town to the Lake Shirley southeastern portion of the Town. There are some isolated floodplain alluvium pockets in the eastern half of the Town and a small band in the southwest corner of the Town that extends to a depth from 50 to 100 feet. Refer to Figure 2-13, Surficial Geology.



Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.

LEGEND

- GEONAMES_PT_HYDRO
- Public Water Supplies

Aquifers

Type

- High Yield (>300 gpm)
- Medium Yield (100-300 gpm)
- Low Yield (<100 gpm)
- DEP Approved Zone II's
- Subwatershed Basins
- Elevation Contours (1:5,000)
- Major Roads
- Minor Roads
- Rail Roads
- Lakes & Ponds
- Rivers & Streams

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

GROUNDWATER HYDROLOGY

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-14

2.4.2.3 Hydrology

The entire town of Lunenburg lies within the drainage basin of the Nashua River. All precipitation that geographically falls within the town of Lunenburg, and does not evaporate, ultimately flows down gradient overland via surface waters such as rivers, streams, lakes, and ponds; and/or, percolates into the subsurface and flows through the aquifers to the Nashua River.

The boundaries of the sub-basins (Catacunamaug, Mulpus and Falulah-Baker) are the approximate drainage boundaries for the Town. Refer to Figure 2-14, Groundwater Hydrology. The principal streams and water bodies that form the main drainage system for surface runoff from Lunenburg include: Mulpus Brook and Hickory Hills Lake (Mulpus sub-basin); Catacoonamaug, Flurcom Swamp Brook, Easter Brook, Lake Whalom, Massapoag Pond, and Lake Shirley (Catacunamaug sub-basin); and, Pearl Hill Brook (Falulah/Baker sub-basin). The Catacunamaug and Mulpus sub-basins drain into the Nashua River via tributaries through the town of Shirley. The Falulah/Baker sub-basin drains into the north branch of the Nashua River. The Lake Shirley network, which includes Lake Whalom and Massapoag Pond, is considered a minor drainage basin that encompasses approximately fifty percent of the Town's land area.[44]

There is a major, unconfined aquifer running in a north-south direction in the eastern portion of Lunenburg. This aquifer lies within the Catacunamaug sub-basin and extends from approximately Massachusetts Avenue to the southeast corner of the Town. The area consists of deposits of sands and gravels having a saturated thickness of more than twenty feet and generally coincides with the lowlands.[45]

DCR maintains a weather station in Lunenburg, referred to as station LUN518. The station location has a Latitude of 42° 35' 15.4" and a Longitude of 71° 41' 53.5".

---

[44] Single EIR for Lunenburg Comprehensive Wastewater Management Plan, December 17, 2001
[45] Single EIR for Lunenburg Comprehensive Wastewater Management Plan, December 17, 2001

Precipitation readings have been recorded from March 1987 through November 2006. Table 2-16 provides a summary of monthly and yearly averages of precipitation recorded. The normal annual precipitation is 47.61 inches. October is usually the wettest month of the year, averaging 4.98 inches while February is the driest month, averaging 3.00 inches. The most rainfall recorded in a single month was 15.19 inches in October 2005.

The average temperature in the region is 46.8°F. The average monthly temperatures in the region range from a high of 71.3°F in July to a low of 23.4°F in January.[46]

In general, the region's weather is typical of New England central states. There is a potential for extreme fluctuation in temperature and precipitation. However, these extremes generally balance, providing for four distinct seasons.

2.4.2.4 Hydrogeologic Setting

The surficial geology of Lunenburg is the geologic factor of the Town's water resources and wastewater subsurface discharges. The Lunenburg Water District supplies water from its public water supplies to approximately 2,085 services[47]. The impact of increased groundwater withdrawal from Town supplies must be considered to avoid groundwater divergence from the general basin groundwater flow.

2.4.3 Environmentally Sensitive Areas

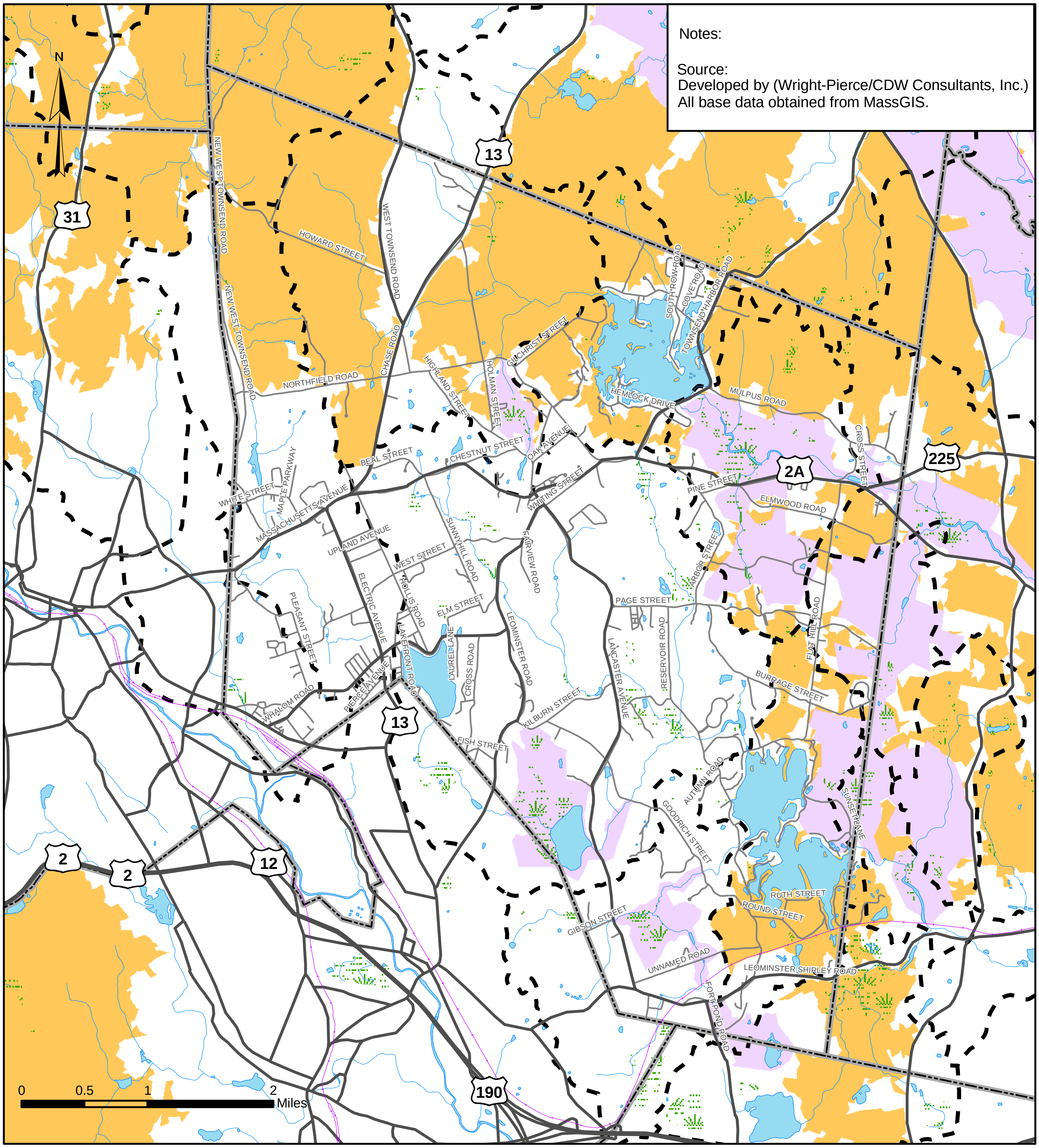
Lunenburg's environmentally sensitive areas include an ACEC, surface waters, wetlands, vernal pools, rare species and wildlife habitats. These locations are depicted on Figures 2-5 and 2-15.

[46] Wastewater Facilities Plan, June 1999.
[47] Presentation on Water Resources of Lunenburg Water District, November 16, 2006

TABLE 2-16
PRECIPITATION AVERAGES[48]

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year Total	Year Average
1987			5.2	11.78	1.2	3.56	1.65	3.59	6.97	4.29	3.2	2.24	43.68[49]	4.37[1]
1988	2.51	2.94	2.08	3.78	4.31	3.17	6.98	3.35	2.48	3.56	6.87	1.22	43.25	3.60
1989	0.99	2.63	2.42	3.9	7.37	5.31	3.68	5.44	5.76	6.71	3.75	1.27	49.23	4.10
1990	4.05	4.83	1.49	5.24	6.7	1.78	2.49	7.26	1.7	7.95	3.23	4.77	51.49	4.29
1991	3.48	2	4.06	5.57	4.1	2.61	3.53	9.14	7.26	3.5	5.22	3.04	53.51	4.46
1992	2.8	2.85	2.98	2.44	4.75	4.93	3.39	5.48	2.42	2.69	5.66	3.85	44.24	3.69
1993	2.68	3.2	6.65	2.99	2.42	1.36	3.21	5.33	5.69	4.93	3.79	5.99	48.24	4.02
1994	3.99	2.19	5.25	2.51	5.63	3.03	4.12	6.84	4.67	1.13	4.72	5.65	49.73	4.14
1995	3.93	2.89	2.09	2	3.63	1.69	2.31	1.41	2.5	9.05	4.84	2.17	38.51	3.21
1996	7.43	3.92	2.54	7.58	2.51	3.13	7.42	2.13	7.02	9.28	2.34	6.78	62.08	5.17
1997	2.94	1.98	6.06	3.63	2.6	1.56	3.24	5.57	2.23	2.68	5.37	3.15	41.01	3.42
1998	4.51	3.12	5.9	3.31	4.51	9.54	1.69	2.45	1.71	4.56	2	1.46	44.76	3.73
1999	5.89	3.61	4.16	1.08	2.75	2.27	3.06	3.48	8.93	3.87	2.6	2.09	43.79	3.65
2000	3.92	4.15	4.42	6.4	3.54	6.56	5.44	1.87	3.31	2.56	3.8	4.29	50.26	4.19
2001	2.05	2.91	6.46	0.95	2.07	7.63	3.13	3.02	3.97	0.75	0.95	2.81	36.7	3.06
2002	2.27	2.22	5.49	3.01	6.15	5.03	1.96	3.26	3	4.53	5.25	4.37	46.54	3.88
2003	2.77	3.95	4.12	3.96	4.56	4.22	1.31	7.37	4.85	5.65	2.35	4.61	49.72	4.14
2004	0.98	1.4	2.75	6.66	4.09	0.78	3.83	3.12	6.96	1.66	3.66	6.34	42.23	3.52
2005	5.1	2.67	5.95	5.67	5.26	3.93	4.24	4.08	1.15	15.19	4.34	4.18	61.76	5.15
2006	5.54	3.46	0.45	2.62	N/A[*]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.07[50]	3.02[2]
Average	3.57	3.00	4.03	4.25	4.11	3.79	3.51	4.43	4.35	4.98	3.89	3.70	47.61	

48 Source: http://www.mass.gov/dcr/waterSupply/rainfall/reports/dbdata.xls
49 Year total and average based on 10 months
* Data not available from Department of Conservation and Recreation
50 Year total and average based on 4 months



LEGEND

- NHESP Biomap Core Habitat
- NHESP Biomap Supporting Natural Landscape
- Lakes & Ponds
- Rivers & Streams
- Subwatershed Basins
- Major Roads
- Minor Roads
- Rail Roads

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

NHESP CORE HABITAT & SUPPORTING NATURAL LANDSCAPE

PROJ NO: 10849B	Wright-Pierce CDW CONSULTANTS, INC. CIVIL & ENVIRONMENTAL ENGINEERS	FIGURE: 2-15
DATE: Oct. 2006		
SCALE:		

2.4.3.1 Areas of Critical Environmental Concern (ACECs) – Squannassit Designation

The Squannassit ACEC was designated in December 2002. Portions of the Squannassit ACEC lie within the town of Lunenburg. The contributing resources within the ACEC boundaries in Lunenburg include water supplies, habitat resources, and land use and open space. The Catacunamaug/Lake Shirley and Hickory Hills aquifers lie within this designation. The designation draws concerns to the increase in Lunenburg's population and the demand that population increase may have on the Town's aquifers. Within this designation in Lunenburg, there are two certified vernal pools, and more than 25 potential vernal pools. According to the Natural Heritage & Endangered Species Program list, there are 23 state-listed rare species known to occur within the boundaries of the Squannassit ACEC.

2.4.3.2 Wetlands

The wetlands are primarily located in the eastern portion of the Town, and are found along Mulpus Brook, Hickory Hills Land, and along the tributaries draining into Lake Shirley. The wetlands provide natural drainage and flood control, groundwater recharge, natural purification, wild habitat and recreational opportunities. The Lunenburg Conservation Commission (Con Com), as part of its authority under the Wetland Protection Act and the town of Lunenburg Wetlands Protection Bylaw, reviews development within wetland areas and issues mitigation measures for work within wetlands or associated wetland resource areas.[51]

2.4.3.3 Species Habitat

There is a mixture of undisturbed habitats within Lunenburg including woodlands and wetlands, which provide food, nesting, and cover for wildlife. The Squannassit ACEC supports wildlife ranging from concentrations of rare and endangered species to deer,

[51] Wastewater Facilities Plan, June 1999.

moose, fisher, bobcat, otter, and even an occasional black bear.[52] Many of the streams are classified as cold water fisheries that support trout and are designated as Outstanding Resource Waters. Refer to Figure 2-15 for the Biomap Core Habitat and Supporting Natural Landscape map for Natural Heritage Endangered Species Program (NHESP).

2.4.3.4 Floodplains

Primary flood hazard areas, identified by the Federal Emergency Management Agency Flood Insurance Study of the Town in 1981, include Baker Brook, Pearl Hill Brook, Mulpus Brook, Catacoonamaug Brook, Lake Shirley, and Whalom Lake. In addition, flood hazard zones have been identified for areas surrounding the wetland and swamp areas. The majority of these areas occur throughout the east-central portions of the Town.

The Town has regulated encroachment in the floodplain by adoption of a Flood Plain District in the Protection Bylaws to protect life and property from damage due to flooding. The Town has mandated low intensity/low impact uses such as agricultural and recreational uses within the Floodplain District.[53]

2.4.3.5 Impaired Waterbodies

The EPA requires all state (and tribal) land waters that do not meet the Clean Water Act standards to biennially report the list of waterways to EPA. These waterways make up the 303d Impaired Waterways list, as associated with Section 303 of the Clean Water Act. Massachusetts has created an Integrated List of Waters that is categorized based on analysis or the waterway or the lack thereof. The definition of categories are as follows:

> Category 1: Are waters where the Department of Public Health advisory pertaining to consumption of fish precludes waters from being in full support of the fish consumption.

[52] Designation of the Squannassit Area of Critical Environmental Concern, December 11, 2002.
[53] Wastewater Facilities Plan, June 1999.

Category 2: These waters are found to support he uses for which they were assessed, but other uses were unassessed.

Category 3: This category contains those waters for which insufficient or no information was available to assess any uses.

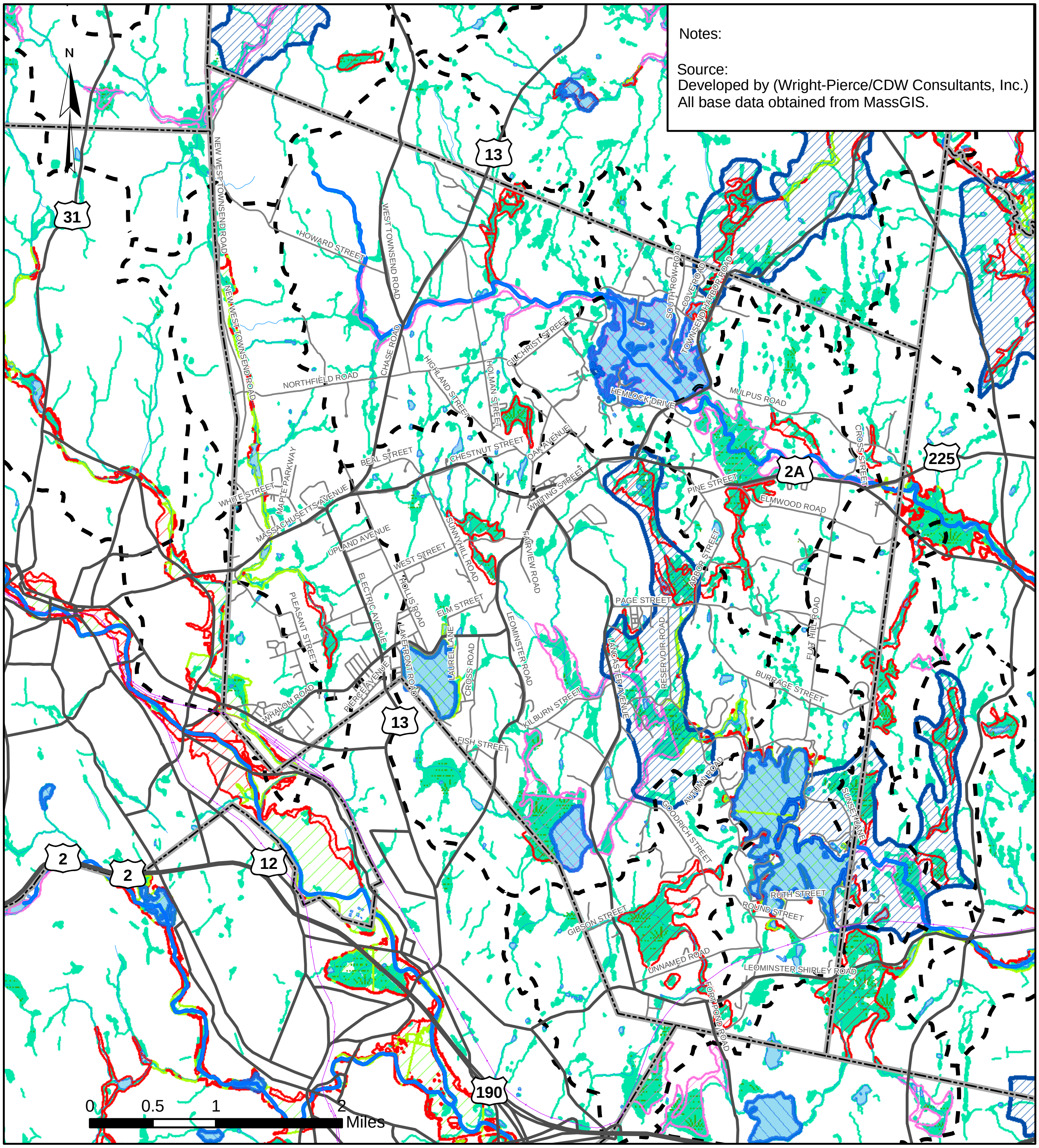
Category 4: Waters exhibiting impairment for one or more uses but not requiring total maximum daily loading (TMDL), which establishes the maximum amount of pollutant that may be introduced into a water body and still ensure attainment and maintenance of water quality standards.

Category 5: Waters exhibiting impairment for one or more uses and does require a total maximum daily loading (TMDL), which establishes the maximum amount of pollutant that may be introduced into a water body and still ensure attainment and maintenance of water quality standards.

The following waterways are included on the Integrated List of Waters:

- Hickory Hills Lake, Category 4b, impaired due to metals (mercury)
- Lake Whalom, Category 4c, impaired due to exotic specie growth
- Massapoag Pond, Category 2
- Lake Shirley, Category 5, impaired due to noxious aquatic plant growth, turbidity, and exotic specie growth
- Mulpus Brook, Category 3, insufficient data to assess
- Catacunamug Brook, Category 3, insufficient data to assess

Refer to Figure 2-16 for location of waters.



Notes:

Source:
Developed by (Wright-Pierce/CDW Consultants, Inc.)
All base data obtained from MassGIS.

LEGEND

- 303d Impaired Rivers & Streams
- 303d Impaired Lakes & Ponds
- DEP Approved Zone II's
- DEP Wetlands
- DEP Wetlands (Rivers & Streams)
- Subwatershed Basins

FEMA
Zone

- A - 100 Year Floodplain (No BFE's)
- AE - 100 Year Floodplain (BFE's)
- X500 - 500 Year Floodplain
- Rivers & Streams

- Lakes & Ponds
- Major Roads
- Minor Roads
- Rail Roads

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

HYDROLOGICALLY SENSITIVE AREAS

PROJ NO:	10849B
DATE:	Oct. 2006
SCALE:	

Wright-Pierce
CDW CONSULTANTS, INC.
CIVIL & ENVIRONMENTAL ENGINEERS

FIGURE:
2-16

2.4.4 Regional Water Quality

Water quality results were provided by the Town of Lunenburg Board of Health. Sampling was performed at the Town beaches for *Escherichia coli* (a.k.a. *E. Coli*) and *Enterococcus* (a.k.a. total coliform). Total coliform is not currently used as an indicator of bacteria at fresh water beaches; however, from 1996 to 1999 samples were collected for analysis of total coliform for the Lake Whalom Town beach. Typically, the collection of samples occurred from June through August. Refer to Table 2-17, Water Quality Results for *E. coli* and Coliform Testing.

In 2003 and 2006, the results of the *E. coli* analysis indicate that there have been peaks in *E. coli* counts at Lake Whalom Town beach exceeding the standard of 235 cfu[54]/100 ml. There was one exceedance at Hickory Hills Lake in August 2005.

To date, the water quality analysis from Lake Shirley in Lunenburg has not indicated a problem with fecal coliform, nor is the Board of Health aware of any testing in Lunenburg that have indicated high bacteria readings for any length of time. Based on a conversation with Mr. Les Smith of the Lake Shirley Association, during the summer of 2006 algal blooms existed in Lake Shirley and were analyzed for toxins. The results of the analysis indicated no toxins were present.

[54]CFU=colony forming units

TABLE 2-17
WATER QUALITY RESULTS FOR E. COLI AND COLIFORM TESTING

	8/28/06	8/21/06	8/14/06	8/10/06	8/7/06	7/31/06	7/24/06	7/17/06	7/10/06
Hickory Hills - Main	10	42	4		<2	134	72	54	152
Hickory Hills - Hemlock	10	50	2		4	10	8	32	10
Town Beach-Lake Whalom[55]			<2	6		22	**>600**[56]	86	24
Shady Point Beach[257]	142	32	46		28	26	162		

	7/5/06	7/3/06	6/29/06	6/26/06	6/19/06	8/22/05	8/18/05	8/17/05	8/16/05
Hickory Hills - Main		8		20		2			228
Hickory Hills - Hemlock		6		14		4	14	22	**280**
Town Beach-Lake Whalom	28	**260**	42	**238**	14				170
Shady Point Beach									

	8/9/05	8/2/05	7/25/05	7/18/05	7/11/05	7/8/05	7/1/05	6/28/05	6/23/05
Hickory Hills - Main	94	2	14	20	32	2	38		
Hickory Hills - Hemlock	8	<2	8	40	4	4	12		
Town Beach-Lake Whalom	<2	14	2	68	154	72		54	
Shady Point Beach					110	<10		50	10

	6/21/05	5/31/05	9/3/04	8/18/04	8/20/04	8/10/04	8/5/04	7/28/04	7/21/04
Hickory Hills - Main			4		4				
Hickory Hills - Hemlock			<2		<2				
Town Beach-Lake Whalom	12			32		50	2	26	58
Shady Point Beach		<10							

	7/14/04	7/9/04	6/29/04	6/25/04	6/21/04	6/17/04	8/28/03	8/25/03
Hickory Hills - Main			6		18	4		
Hickory Hills - Hemlock			16		24	10		
Town Beach-Lake Whalom	6	56	4	20			20	60

	8/18/03	8/20/03	8/21/03	8/11/03	8/6/03	8/4/03	7/29/03	7/2/03
Hickory Hills - Main								2
Hickory Hills - Hemlock								
Town Beach-Lake Whalom	**500**	10	**430**	6	24	234	<2	

	8/6/02	7/31/02	7/22/02	7/15/02	7/9/02	7/1/02	6/18/02
Hickory Hills - Main							
Hickory Hills - Hemlock							
Town Beach-Lake Whalom	20	10	30	32	126	206	36

	COLIFORM BACTERIA-Enterococcus (NOT SPEC. E. coli)								
	7/19/99	**8/10/98**	**7/18/98**	**7/14/98**	**7/8/98**	**6/26/98**	**7/20/97**	**7/16/97**	**7/8/96**
Hickory Hills - Main									
Hickory Hills - Hemlock									
Town Beach-Lake Whalom	50	**100**	<50	**750**	**150**	**680**	**250**	**200**	**100**

[55] Samples were also collected on 7/27/06 and 7/28/06. Results for both samples were 2.
[56] Results in bold represent exceedance of the Massachusetts Department of Public Health Standard of 235cfu/100 ml for E. coli and 61 cfu/100ml for Enterococcus.
[57] A sample was also collected on 8/3/06 and the result was 26.

2.4.5 Air Quality

Lunenburg is located in a rural setting with primarily residential and minimal industrial development that could impact air quality. According to the EPA Envirofacts database, there are 6 facilities in Lunenburg which produce and release air pollutants. However, these facilities are all in compliance, meaning their current emissions meet regulatory standards. Table 2-18 gives a list of these facilities.

TABLE 2-18
EMISSION SOURCES[58]

FACILITY NAME	LOCATION	COMPLIANCE STATUS	CLASS CODE
Fitchburg Gas and Electric	Pleasant Street	In Compliance (Inspection)	Potential Uncontrolled Emissions < 100 TONS/YR
Nashoba Valley Structural	571 Chase Road	In Compliance (Inspection)	Potential Uncontrolled Emissions <100 TONS/YR
PJ Keating Company	998 Reservoir Road	In Compliance (Inspection)	Potential emissions below major source thresholds if compliance is identified.
S&E Specialty Polymers, LLC	140 Leominster/ Shirley Road	In Compliance with Procedural Requirements	Potential Uncontrolled Emissions <100 TONS/YR
Wakefield Materials Corporation	1000 Reservoir Road	In Compliance with Procedural Requirements	Potential Uncontrolled Emissions <100 TONS/YR

Based on current trends and uses, increases in commercial and industrial development in the Town will make no significant changes in air quality with future development.

58 Source:http://oaspub.epa.gov/enviro/

2.5 WATER SYSTEM AND SUPPLY SOURCES

The information provided in this section is based on a report prepared by Stantec Consulting Services, Inc. entitled Water Supply Assessment Study, prepared for the Lunenburg Water District (District), and dated January 2007. The Stantec report is based on information between the years of 1990 and 2005. Water usage information for year 2006 has been provided directly by the District.

2.5.1 Town's Water System

The Lunenburg Water District provides service to approximately 5,265 people, or 55 percent of Lunenburg's population. The District has six wells, five of which are in the Catacunamaug Brook sub-basin and one in the Mulpus Brook sub-basin. Only four of the five wells in the Catacunamaug Brook sub-basin are currently active. These active wells are located on Lancaster Avenue and are identified as: Well 1, Well 2, Well 4, and Well 5. The inactive Well 3 was last used in 1983. The one well in the Mulpus Brook sub-basin is located on Hickory Hills Lake and is identified as either the Hickory Hills Well or Well 6. It was not included in the Stantec report for any calculations regarding available water. This well is active and used on occasion during peak periods, according to information provided by the District. The Hickory Hills Well is not used regularly because continuous use results in complaints of "dirty" water from consumers. As stated in the Stantec report, the maximum daily withdrawal from each of these wells is shown in Table 2-19.

TABLE 2-19
WATER DISTRICT WELL WITHDRAWAL CAPACITIES

Well No.	Maximum Daily Withdrawal (gpm)	Average Daily Withdrawal* (mgd)	Maximum Daily Withdrawal (mgd)
1	122	0.117	0.176
2	75	0.072	0.108
3	200 (inactive)	0.192 (inactive)	0.288 (inactive)
4	200	0.192	0.288
5	280	0.269	0.403
6	500	0.480	0.720

*The District's normal (average) maximum pumping schedule is 16 hours per day. This allows 8 hours for well recharge and equipment "downtime."

The District currently has the capacity to withdraw 0.97 mgd during a 24-hour continuous pumping cycle from the four active wells. During a normal 16-hour day of usage the District has the capacity to withdraw 0.65 mgd from the four active wells. However, under the current Water Management Act (WMA) Permit the District is allowed an average withdrawal of 0.51 mgd. In accordance with the WMA, DEP allows for an additional 0.1 mgd over the permitted volume thus allowing for an average withdrawal of 0.61 mgd while still being within the permit limits.

2.5.2 Existing Water Use Trends and Projected Needs

From 1990 to 2005, service connections to the Water District's supply have increased by 40 percent. This was a direct result of the installation of water mains in the Hickory Hills area of town. Water use trends from 1990 through 2006 listed in Table 2-20.

TABLE 2-20
HISTORICAL WATER USAGE

Year	Max. Day Usage (mgd)	Average Day Usage (mgd)	Total No. Service Connections
1990	0.61	0.34	1,490
1991	0.75	0.35	1,552
1992	0.19	0.35	1,604
1993	0.98	0.39	1,676
1994	0.93	0.39	1,745
1995	0.79	0.39	1,770
1996	0.84	0.38	1,799
1997	1.14	0.42	1,836
1998	1.01	0.44	1,862
1999	1.17	0.51	1,888
2000	0.88	0.47	1,925
2001	1.03	0.55	1,958
2002	1.02	0.51	1,986
2003	1.03	0.44	2,041
2004	1.19	0.54	2,072
2005	1.02	0.46	2,085
2006	0.98	0.46	2,106

*Stantec *Water Supply Assessment Study* Table 2.5.2-1 with the exception of 2006 data, which was obtained directly from the Lunenburg Water Dept.

Residential connections accounted for 1,981 of the 2,085 services in year 2005. As noted in the above table, although service connections have increased the average daily usage has seen a decline in recent years. As mentioned in the Stantec report, a reduction in unaccounted for water (UAW) and water conservation has helped minimize the increase in average daily consumption. UAW is the difference between the recorded amount of water pumped from the wells and the actual amount of water recorded at the individual meters. The District reported the UAW to be 7.5percent in 2006 which is below the target of 10 percent set by the Massachusetts DEP. The UAW was down from 9.2 percent in 2005. Also in 2005, the residential gallon per capita per day (rgpcd) was 65, which is the MA DEP target set for medium-stressed and high-stressed river basins.

The District is currently meeting its WMA Permit; however, the existing wells cannot meet guidelines[59] for maximum day demand. The District's water supply should be capable of meeting the maximum daily demand each year without relying on its system's storage. According to the guidelines, the storage should be reserved for the volume of water required for fire protection, during periods of peak consumption when the largest producing source (well) is out of service. Stantec's report indicates that when the largest producing well, Well 5, is taken off-line the capacity of the system is reduced from 0.97 mgd to 0.57 mgd. The following are the projected maximum daily water supply needs:

TABLE 2-21
DEMAND AND AVAILABLE SUPPLY

Year	Maximum Daily Demand (mgd)	Available Supply without Well No. 5 (mgd)	Average Daily Needs (mgd)
2005	1.12	0.57	0.55
2008	1.25	0.57	0.68
Buildout	1.75	0.57	1.18

*Stantec *Water Supply Assessment Study* Table 2.5.2-2

[59] MA DEP Guidelines and Policies for Public Water Systems and the AWWA Distribution System Requirements for Fire Protection.

The water supply needs developed in the Stantec report are based on population projections presented in the April 2002 Master Plan and the EOEA buildout analysis for the town.60 Also, the water supply needs are based on well capacity estimates and water works best management practices (BMPs). It is stated in the Stantec report that these demand values should be considered approximate. However, for the year 2005, it is apparent that the District's available supply, without the largest producing Well 5, is below the maximum daily demand as indicated in the above table. Therefore, the District's water supply does not meet the BMPs according the MA DEP and AWWA guidelines.

Stantec reviewed the proposed development of 676 units for Lunenburg and indicated that the year 2008 maximum daily and average daily demand would be 1.20 mgd and 0.57 mgd, respectively. These consumptions rates are lower than the projected consumptions rates in Table 2-21. However, the buildout projections are higher for the maximum daily demand, estimated to be 1.92 mgd and lower for the average daily needs of 0.91 mgd.

2.5.3 Future Well Sites / Water Supply Alternatives

To address the projected water supply deficits, it is suggested that the District will need to look at additional source alternatives, as well as increase water conservation efforts. The Stantec report identified five potential source alternatives:

1. Upgrade existing supplies. This would involve installing replacement wells in the area of Well 2 that have the pumping capacity of 400 gpm combined. The District is currently seeking DEP approval for this alternative, requesting the original yield of 400 gpm (0.57 gpd) for Well 2 and Well 3. A prolonged pump test with water quality data would be necessary to reactivate Well 3, work which is not anticipated at this time.

2. Develop a new supply. This involves the funding, study, approval, and construction of a new municipal well supply. The District has identified a potential site north of Route 2A on conservation commission Cowdrey property in the Mulpus Brook sub-basin. Despite

[60] The population projections developed by Wright-Pierce for the CWMP are higher than those presented in the April 2002 Master Plan and the EOEA buildout analysis for the town.

funds having already been voted and allocated for this task, the Town has yet to approve the District's request to begin the DEP's New Source Approval process.

3. Bedrock Investigation. This would involve follow up testing by the District on the completed preliminary fracture trace studies and identified potential sites.

4. Treat the Hickory Hills Well. In order to use the well continuously a water treatment plant would be needed to remove iron and manganese, effectively solving the problem of "dirty" water.

5. Obtain water from an adjacent Town. The District could seek out neighboring communities that would be willing to sell water to the town, which would require installations of water mains and potentially booster pumps.

2.5.4 Water Conservation Efforts

As stated in the Stantec report, the District has taken several steps to conserve water by initiating a meter replacement program, conducting leak detection surveys, and increasing block rate billing structure. By replacing old water meters, the District will be able to account for a more accurate amount of water used by consumers. Leaks in the water mains are inevitable, but by determining where they occur, the District can ensure that water lost is minimized. Utilizing an increasing block rate billing structure encourages the consumer to minimize water use by increasing the unit price for water as the volume consumed increases. Prices are set for each block of water use.

The Stantec report reiterates the following suggestions by the MA DEP that the District emphasize the following water conservation techniques:

- Public education
- Leak detection and water audits
- Metering
- Price schedule
- Municipal water use

2.6 EXISTING WASTEWATER FLOWS AND TREATMENT

2.6.1 Town's Wastewater Facilities and Infrastructure

2.6.1.1 Overview

For many years, the primary method of wastewater disposal in the town of Lunenburg was through individual on-site wastewater disposal systems. These systems serviced approximately 98 percent of Lunenburg's residential, commercial, and public buildings. The remaining properties were serviced by two nearly 75-year-old gravity sewer systems located in the Whalom Lake and Summer Street areas that conveyed flow to Leominster and Fitchburg respectively. The City of Leominster constructed approximately one mile of sewer around 1930 and in 1979 was determined by American Consulting Services to have serious infiltration/inflow (I/I)* problems. Although the City of Leominster has undertaken projects to eliminate I/I into their system, it is not clear whether the I/I issue with this specific segment of sewer line has been addressed. The approximately 75-year-old Summer Street sewer which flows to Fitchburg was discovered in the late 1990s. It serves a number of properties in the southwest corner of Lunenburg, which until that point were not known to be connected to the Fitchburg sewer system, as noted in the Lunenburg Facilities Plan 1999. After the discovery of this line, the properties served have been billed by the Town of Lunenburg for sewer service.

In response to environmental and health concerns over failing individual systems as well as public interest in connecting to the existing sewers, the Town completed a Facilities Plan in 1999. The Plan recommended a three phase construction plan for a sewer system expansion with connections to Fitchburg through Summer Street and Massachusetts Avenue (Route 2A) and creating a new connection to Leominster on Graham Street. The Town entered into an Intermunicipal Agreement (IMA) with Fitchburg in 1994 allowing Lunenburg to discharge up to 500,000 gallons per day (average monthly flow) of wastewater to the Fitchburg sewer system. The Town entered into a similar agreement with Leominster in 1999. The IMAs are described in detail later on in this section.

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* Glossary

The most critical areas of need, as determined by the 1999 Facilities Plan, were addressed in Phase I. Upon recent completion of Phase I sewer construction, Lunenburg postponed Phase II construction pending further investigation into the areas of need. The current Lunenburg sewer collection system discharges approximately 37,000 gpd to Fitchburg and approximately 56,000 gpd to Leominster. Approximately 7.1 percent (336 parcels) of Lunenburg's 4,700 parcels of land are connected to the sewer system, while an additional 9.6 percent (451 parcels) have been assessed betterments, and are therefore entitled to connect to the existing sewer system.

2.6.1.2 Existing Collection System

The wastewater collection system in Lunenburg consists of approximately 14 miles of gravity sewer, ranging in diameter from 8 inches to 18 inches, and approximately 4 miles of force main, as shown in Figure 2-17 and detailed in Appendix F. There are three separate networks of gravity sewers and pumping stations; one is tributary to the city of Leominster via Graham Street, and the other two tributary to the city of Fitchburg via Summer Street and Massachusetts Avenue. The majority of the sewers are constructed of polyvinyl chloride (PVC)[*], although several sewer sections of Electric Avenue and Massachusetts Avenue are believed to have been constructed of ductile iron (DI) [*] due to the proximity of the sewer to nearby water lines in these areas. The system manholes are pre-cast concrete cylinders with solid cast iron manhole frames and covers. The inventory of the sewer collection system, as of April 2007, is included in Table 2-22.

The majority of Lunenburg's wastewater collection system conveys flow to the City of Leominster's Wastewater Treatment Facility, as shown in Figure 2-17. This network of sewers connects to the Leominster collection system through an 18-inch PVC line on Graham Street. The network services the Whalom area along Whalom Road from and including Graham Street up to Prospect Street. Most of the side streets, including portions of Electric Avenue, in the area are serviced by the collection system.

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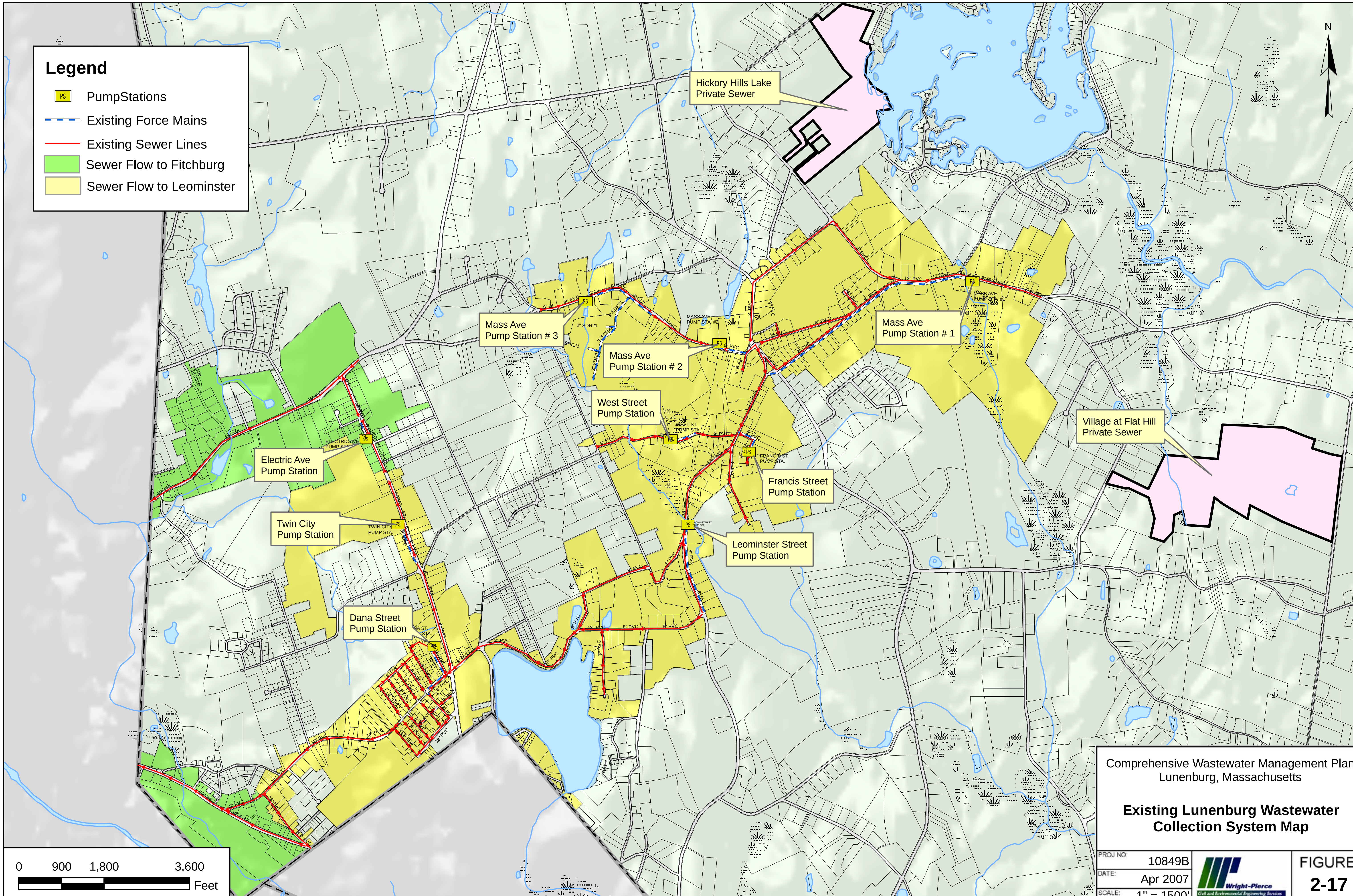
[*] Glossary
[*] Glossary

TABLE 2-22
EXISTING WASTEWATER COLLECTION SYSTEM

Gravity Sewer System		
	Total Length (ft)	Total Length (miles)
Phase 1	73,657	13.95
Contract 1	21,850	4.14
8" PVC	9,623	1.82
10" PVC	2,858	0.54
18" PVC	9,369	1.77
Contract 2	45,340	8.59
8" PVC	36,628	6.94
12" PVC	1,994	0.38
18" PVC	5,405	1.02
Electric Ave	6,467	1.22
Existing Prior to Phase 1	10,610	2.01
System Total	**84,267**	**15.96**

Force Mains		
Force Main	**Size & Type**	**Approx Length (ft)**
Dana St (Whalom Rd) PS	10" DI	1200
Leominster Rd PS	10" DI	4025
West St PS	2" HDPE	575
Francis St PS	2" HDPE	760
Mass Ave PS #1	8" DI	6985
Mass Ave PS #2	4" HDPE	1175
Mass Ave PS #3	3" HDPE	1500
Twin City (200) PS	3" HDPE	950
Electric Ave (100) PS	3" HDPE	600
Stone Farm Adult Community[1]	2" SDR21	1130
	3" SDR21	1350
	Total (mi):	**3.84**

[1] The Stone Farm Adult Community is a low pressure force main system, where each house has a grinder. The 3" force main connects to Mass Ave and flows to Leominster.


Legend
PumpStations
Existing Force Mains
Existing Sewer Lines
Sewer Flow to Fitchburg
Sewer Flow to Leominster
N
Hickory Hills Lake Private Sewer
Mass Ave Pump Station # 3
Mass Ave Pump Station # 2
Mass Ave Pump Station # 1
West Street Pump Station
Village at Flat Hill Private Sewer
Electric Ave Pump Station
Francis Street Pump Station
Twin City Pump Station
Leominster Street Pump Station
Dana Street Pump Station
0 900 1,800 3,600
Feet
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts
Existing Lunenburg Wastewater Collection System Map
PROJ NO: 10849B
DATE: Apr 2007
SCALE: 1" = 1500'
Wright-Pierce
FIGURE: 2-17

The system extends up Prospect Street onto Leominster Road and continues to the center of town. The sewer extends from the town center west along Massachusetts Ave (Route 2A) up to Beal Street and Sunny Hill Drive; north along Main Street and Oak Ave up to Northfield Road; east along Massachusetts Ave (Route 2A) up to Arbor Street. Most side streets along these roads are connected to the Leominster sewer network.

The Town of Lunenburg has two connections to the City of Fitchburg's sewer system, both flowing to the Fitchburg East Wastewater Treatment Facility. The connection through Massachusetts Avenue (Route 2A) was constructed in 1994 to service the Lunenburg Crossing Plaza, a commercial shopping center, and approximately 30 abutting properties. It now services approximately one mile into Lunenburg, just past and including part of Electric Avenue. The connection through Summer Street was constructed in 1994 to service Donnelly's Tavern and Roger Brother Company. It now services Summer Street and Whalom Road up to Graham Street.

The old Summer Street gravity sewer connection that was discovered in the late 1990s, which served a number of properties on lower Summer Street, is no longer in use. It was replaced by a new 8" PVC sewer and abandoned in place as part of the Contract 2 work of the Phase 1 sewer construction.

The old Whalom area gravity sewer network is still partially in use. Prior to being cutoff and removed west of Electric Avenue during Lunenburg's recent sewer construction, the 5,300 feet of 8- and 10-inch pipe serviced 84 residential and commercial properties. The sewer network is owned by Leominster, who also provides water to the majority of the properties and directly bills the Lunenburg customers. The public sewers in this area are believed to service lower Lakefront Avenue, Lakeside Avenue, Wilderwood Avenue, Crocker Avenue, Barrett Avenue, and Wilder Road as shown highlighted in yellow in Figure 2-17. Discussions with the Town of Lunenburg indicated that flow from these properties does not count towards the total allowable flow governed by Lunenburg’s IMA amount with Leominster.

2.6.1.3 Pump Stations

The Lunenburg wastewater collection system utilizes nine wastewater pumping stations to transport wastewater through areas where gravity sewer is not feasible. All of the stations have been constructed during the recent Phase I sewer expansion as recommended by the 1999 Facilities Plan. The three largest pumping stations are above grade, vacuum prime systems housed in fiberglass buildings. The remaining six pumping stations are housed in below grade precast concrete structures with submersible pumps. The physical characteristics of the pump stations are summarized in Table 2-23.

All of the stations have alarms and emergency generators. The alarms are transmitted to the Department of Public Works via cell phone. Each type of alarm has a corresponding code to inform the DPW as to the nature of the emergency.

2.6.2 Planned Sewer Expansion

There is currently no planned sewer expansion in Lunenburg. The construction of the Phase II sewers, as recommended in the 1999 Facilities Plan, has been postponed until the current CWMP is completed. The Town is currently investigating the feasibility of not allowing any further extension of the existing sewer network until completion of the current study.

2.6.3 Private Facilities

There are two areas in town that are serviced by small packaged wastewater treatment facilities. One facility is located at Woodlands Village and the other is located at the Village at Flat Hill.

The Woodlands Village facility is located on the west side of Hickory Hills Lake on Royal Fern Drive. The privately owned condominium complex was previously called Lakeshore Village. It was originally issued a 5-year groundwater discharge permit (GWDP)[*] and constructed in 1988 to treat an average daily flow of 20,000 gallons per day (gpd) [*]. The original facility was

[*] Glossary
[*] Glossary

TABLE 2-23
EXISTING PUMP STATIONS

ID	Name/Location	Type	Built (Year)	Design Capacity (gpm@tdh/rpm)		Pumps			Alarms	Generator
				Initial	Future	No.	Model/Size	Hp	Y/N	Y / N
1	Massachusetts Avenue 1	Above Grade Vacuum Prime in Fiberglass Bldg	2004	500 @ 169 / 1780	700 @ 193 /1780	2	Cornell 4414T-VM	75	Y	Y, 150 kW
2	Massachusetts Avenue 2	6' I.D. Concrete Below Grade	2004	140 @ 55' / 3500	-	2	Flygt 3127.890-5101	7.5	Y	Y, 15 kW
3	Massachusetts Avenue 3	5' I.D. Concrete Below Grade	2004	80 @ 60' / 3450	-	2	Flygt 3127.890-5101	5	Y	Y,10 kW
4	Francis Street	5' I.D. Concrete Below Grade	2004	30 @ 37' / 3450	-	2	Flygt 3085.891-0042	2	Y	Y, 8 kW
5	West Street	5' I.D. Concrete Below Grade	2004	30 @ 36' / 3450	-	2	Flygt 3085.891-0042	2	Y	Y, 8 kW
6	Leominster Road	Above Grade Vacuum Prime in Fiberglass Bldg	2004	780 @ 92 / 1185	920 @ 101.5 / 1185	2	Cornell 4NHTB-VM	40	Y	Y, 100 kW
7	Dana Street / Whalom Road	Above Grade Vacuum Prime in Fiberglass Bldg	2001	960 @ 36.5 / 1175	1105 @ 40 / 1175	2	Fairbanks Morse 5433	20	Y	Y, 50 kW
8	Electric Avenue	6' I.D. Concrete Below Grade	2005	65 @ 63' / 3450	-	2	Flygt 3102.890-5118	3	Y	Y, 8 kW
9	Twin City	6' I.D. Concrete Below Grade	2005	65 @ 63' / 3450	-	2	Flygt 3102.890-5118	3	Y	Y, 8 kW

designed to utilize a rotating biological contactor (RBC) [*] system to treat the wastewater. The treated wastewater was then discharged into the ground via leaching fields. However, the plant was never in full operation because the wastewater flows were inadequate for maintaining efficient plant performance. The system was to be utilized as a conventional septic system until design flows were reached.

In 1998 the DEP approved a RUCK system for pilot testing up to 10,000 gpd at the Woodlands facility. In 2000 the Woodlands Village GWDP was modified for the use of a RUCK system for 12,500 gpd or the RBC system for 20,000 gpd. The RBC system was to be kept in operational condition for use as a backup until the RUCK system proved its ability to meet permit effluent limits. In 2002 the GWDP was renewed for the treatment of 12,500 gpd by the RUCK system. The trial period for the RUCK system was closed and the RBC system was approved to be dismantled and sold. Refer to Appendix G for a copy of the GWDP for this system.

Per a DEP inspection in February 2004, the condominium complex was at full build-out and the WWTF was receiving approximately 4,000-7,000 gpd of sanitary wastewater flow. The RBC units had been reportedly sold and awaiting removal. The RUCK system appeared to be operating normally.

The Woodlands Village facility has been issued a Notice of Noncompliance (NON)[*] from DEP on three separate occasions, April 21, 2001, March 17, 2003, and February 10, 2004, since being issued the modified GWDP in 2000. The NONs focus on the facility's inability to consistently meet effluent limits, specifically nitrate nitrogen and BOD. The facility is believed to currently be in compliance with the latest GWDP.

[*] Glossary
[*] Glossary

The Village at Flat Hill facility is located at the property formerly known as the Sweeney Property between Arbor Street and Flat Hill Road. The residential subdivision was issued a 5-year GWDP in 2002 for the treatment of an average daily flow of 14,850 gpd. Refer to Appendix H for a GWDP for this system. The facility is designed to utilize a Bioclere™ package with denitrification to treat the wastewater. The treated effluent wastewater is discharged into the ground via leaching trenches.

As of a DEP letter to the Lunenburg Board of Health in September 2006, the complex currently averages 4,600 gpd, with occasional peaks near 9,300 gpd. The local BOH had notified the DEP that the complex exceeded the number of bedrooms (135) used to determine design flow for the GWDP permit. The DEP acknowledged that the current number of bedrooms (139) exceeded the number used to determine the design flow but would not have an objection to a request for some additional bedrooms at the complex to increase actual flow, provided that such a request does not violate the terms of any local approvals.

The Village at Flat Hill facility has been issued a Notice of Noncompliance (NON) from DEP on two separate occasions, September 28, 2004 and May 27, 2005, since being issued the GWDP in 2002. Both NONs focus on the facility's inability to consistently meet effluent limits, specifically Total Nitrogen, BOD[*], and Nitrate Nitrogen. The facility was found by DEP to have returned to compliance on February 3, 2006.

2.6.4 Existing Intermunicipal Agreements

The Town of Lunenburg and the City of Fitchburg finalized an Intermunicipal Agreement (IMA) on March 11, 1994. This IMA allowed Lunenburg to convey up to 500,000 gpd of wastewater to Fitchburg for treatment and disposal at the Fitchburg East Wastewater Treatment Facility. The duration of the IMA was set at twenty years. However, a clause was written into the IMA which would reduce the amount of wastewater allowed under the agreement. This “capacity not utilized” clause revised the amount of the IMA from

[*] Glossary

500,000 gpd to an amount equal to the average daily flow in the maximum month in Years 8, 9, and 10 of the agreement, plus 40,000 gpd. According to the Fitchburg DPW, the “capacity not utilized” clause reduced the IMA allowed flow to 80,000 gpd. If capacity beyond this 80,000 gpd limit is required, the IMA would need to be renegotiated with the City of Fitchburg. A copy of this IMA is included in Appendix I.

Under this IMA, the Town of Lunenburg is responsible for monitoring the flow which is conveyed to Fitchburg. Although a flow meter was installed as part of the sewer installation in Massachusetts Avenue, the meter has malfunctioned, and is no longer used. Instead, the flow is estimated by the Town of Lunenburg based on water usage.

Lunenburg entered into a separate IMA with the City of Leominster in June 22, 1999. This IMA was essentially the same as the IMA with Fitchburg, with the notable exception of the lack of the “capacity not utilized” clause to reduce the amount of the IMA. Therefore, the amount of flow allowed under the IMA will remain at 500,000 gpd for the twenty-year duration of the agreement. A copy of this IMA is included in Appendix J.

2.6.5 Sewer Use Regulations

Properties which are connected to the Town of Lunenburg’s wastewater collection system are governed by the Town’s “Sewer Use Regulations”. These regulations were based largely on the City of Fitchburg’s Sewer Use Regulations, and were adopted at the May 7, 2005 Annual Town Meeting. The regulations contain many requirements and limitations on the characteristics of the wastewater which is discharged into the system. These requirements include provisions to allow the wastewater to be effectively treated at the Fitchburg East Wastewater Treatment Facility, such as temperature, as well as limiting the amount of potentially hazardous materials present in the WWTF influent, such as volatile hydrocarbons and heavy metals.

It appears that the Sewer Use Regulations adopted by the Town of Lunenburg are more suited to minimize impact from industrial-type wastes. While these types of regulations are necessary for a city like Fitchburg, with significant industrial contributors, to govern its wastewater contributors, many of the requirements do not affect much of the activities of the residential and commercial development in Lunenburg. Given the possibility that responsibility for inspection and approval of sewer extensions will soon shift from DEP to the municipal level, it is important that the Town have in place regulations to administer sewer extension permits. At a minimum, the Town should adopt the New England Interstate Water Pollution Control Commission's *Guides for the Design of Wastewater Treatment Works* standards, commonly referred to as "TR-16" [*]. This guide contains specific minimum criteria for design and construction of wastewater collection systems, including pipe material, slope, and capacity. Additionally, the Town should review the details and methods of construction used on the Phase 1 sewer project already constructed, and apply "lessons learned" from that project. Details, materials and methods which served the project well could be written into the Sewer Use Regulations. Conversely, specific details for the design or construction of the sewer system which did not perform as desired could be prohibited.

It is also recommended that the Town of Lunenburg investigate the fee amounts set forth in the Sewer Use Regulations. As currently written, a sewer connection permit application fee is as little as $10. The Town should investigate the amount of effort which will be required for Town personnel to review the application, and revise the fee accordingly. Massachusetts DEP's applications for sewer extensions carry fees of $2,545 for extensions greater than 2,500 feet, and $410 for extensions less than 2,500 feet. Another alternative would be to base the fee on the construction cost of the sewer, similar to the fee structure for building permits.

[*] Glossary

2.6.6 Fitchburg and Leominster Wastewater Treatment Facilities

All flow entering Fitchburg from Lunenburg is eventually conveyed to the Fitchburg East Wastewater Treatment Facility. This treatment facility is designed to handle an average daily flow of 12.4 mgd. According to the Fitchburg DPW*, the treatment facility currently handles an average daily flow of 8 to 9 mgd. The City is considering an upgrade to the facility, however, the upgrade would provide a higher level of treatment, and would not increase hydraulic capacity. However with the elimination of other flows in the system, such as I/I, the City was confident that additional flows from Lunenburg could be treated at the Fitchburg facility.

The City of Fitchburg is also investigating their options for replacing the "JFI line", which is the existing sewer beneath John Fitch Highway which ultimately conveys flow entering from Lunenburg to the Fitchburg East WWTF. Recent inspection has shown this sewer to be in poor structural condition, and in need of rehabilitation or replacement. The City of Fitchburg indicated that repair of this sewer would be an important consideration in any renegotiation of the IMA which would increase the flow allotted to Lunenburg above the current 80,000 gpd limit.

The City of Leominster operates a single wastewater treatment facility, which is rated at 9.3 mgd of average flow capacity. Discussions with the Leominster DPW indicated that the City is attempting to remove extraneous I/I flow from their system, and that they did not believe that additional flow from Lunenburg above the amount allowed under the IMA could be handled by the collection and treatment system.

2.6.7 Existing On-site Subsurface Wastewater Disposal Systems

As mentioned earlier, prior to the sewer construction recommended in the 1999 Facilities Plan, approximately 98 percent of Lunenburg's residential, commercial, and public buildings were serviced by on-site wastewater treatment and disposal systems. The

* Glossary

majority of these systems were installed prior to the adoption of the original Title 5 Environmental Code in 1978. All of the properties that abut the new sewer networks have either connected to the sewer or have been bettered for future connection to the sewer.

Approximately 800 parcels were assessed betterments to finance the Phase I sewer construction. This is approximately 17 percent of the total number of parcels in the town of Lunenburg, according to the assessor's database. Less than half of these parcels (336) are currently connected to the sewer. The remainder of the parcels has the ability to connect to the sewer, and must be accounted for in wastewater planning.

Approximately 93 percent of the properties in Lunenburg continue to rely on on-site wastewater disposal systems for wastewater treatment and disposal. Based on the number of households in the Town and the number of households currently connected to the sewer, this means that approximately 620,000 gpd of wastewater that is generated within the Town is currently treated by on-site systems. These properties use a conventional Title 5 septic system, a Title 5 septic system with one or more variances, an innovative & alternative system, a cesspool, or a combination. The quality and ability of these systems to comply with current Title 5 regulations will be discussed later in this report.

2.6.8 Wastewater Flows

The wastewater flows for Lunenburg were analyzed using data from the Town, as well as the Metcalf & Eddy *Wastewater Engineering* textbook 4th edition, and the Massachusetts Environmental Code (Title 5). Flows from residential properties were estimated by the number of bedrooms present at each parcel, according to the Lunenburg Assessor's database. For residential sanitary flows, it was determined that the State Environmental Code was overly conservative in their estimate of 110 gallons per day per bedroom. In fact, this figure is approximately twice the actual rate of water usage the Lunenburg Water District (LWD) sees. As such, we reduced the estimated flow generation to reflect the LWD actual numbers of 170 gpd for a residential service. The average residential home in Lunenburg is 3 bedrooms, according to the Assessor's database. Therefore, we estimated sanitary flows based on a generation rate of 57 gpd/bedroom. Estimating flow on a "per bedroom" basis instead of a "per capita" basis allows estimates to be specific to each parcel listed in the Town Assessor's database, instead of using the same average household size, and therefore the same sanitary wastewater generation rate, for every residential parcel in the town. Using the average household size in Lunenburg of 2.64 people per household, this 57 gpd/bedroom rate corresponds to per capita rate of 64 gpd/person, which is within the expected range according to industry standards.

Additionally, wastewater generation for the four public schools was based on actual water usage at the schools for the non-summer months of the year. For non-residential flows, water usage data for individual parcels was unavailable, so the wastewater generation rate was estimated based on the use of the parcel. A survey of the non-residential parcels in the sewered areas of Lunenburg was conducted to determine the type of activity taking place at each parcel. Both the State Environmental Code, the wastewater textbook, and experience with similar generation rates in other Massachusetts municipalities were consulted to determine the generation rate. Table 2-24 shows the wastewater generation rates used to determine sanitary flows from different types of commercial properties.

These wastewater generation rates were used to estimate the total sanitary wastewater flow currently being generated, as well as possible future generation rates.

TABLE 2-24
COMMERCIAL WASTEWATER RATES

BUSINESS TYPE	WASTEWATER GENERATION RATE
Retail	50 gpd/1000 SF
Auto Repair	125 gpd/service bay
Barber	100 gpd/chair
Doctor's Office	250 gpd/doctor
Dentist's Office	200 gpd/doctor
Restaurant	35 gpd/seat
Fast Food Restaurant	20 gpd/seat
Office Building	13 gpd/employee
Daycare Facility	10 gpd/student
Church	3 gpd/seat

2.6.9 Existing Sanitary Flows

The existing sanitary flows to Fitchburg were estimated at approximately 37,000 gpd based on the above methodology. This total is comparable to the amount of flow experienced from 2002-2004, when the "capacity not utilized" clause of the IMA with Fitchburg reduced the amount of flow allowed, and also compares well to the latest actual billings (based on water usage) of 35,000 gpd, for the 3rd quarter of 2006. Of the sanitary flow currently being conveyed to Fitchburg, approximately 80 percent is generated in the commercial districts along lower Massachusetts Avenue and Summer Street. Individual parcels contributed large portions of this flow include the Wal-Mart plaza, the Crossroads Plaza, and Bootlegger's Tavern on Massachusetts Avenue, as well as the American

Graffiti restaurant, Donnelly's Tavern, and the Whalom Mobile Home Village on Summer Street.

Existing sanitary flows to Leominster were estimated at 56,000 gpd, which was comparable to the latest billed quantity (based on water usage) of 53,000 gpd. Although the sewered area which drains to Leominster is much larger than that which drains to Fitchburg, the flow entering Leominster is approximately 50 percent more than that sent to Fitchburg. One explanation for this is that the majority of the area which sends flow to Leominster is residential, instead of the commercial districts which convey flow to Fitchburg. Approximately 11 percent of the sanitary flow which is conveyed to Leominster originates at the four schools in Lunenburg. Due to the large variability in predicted flows at schools, we used actual water usage from the past year to determine the flow from the four schools in Lunenburg. Other parcels which were estimated to contribute flows over 1,000 gpd include the Village commercial complex near Town Hall, the Twin City Baptist Temple and School, and Sean Patrick's restaurant on Electric Avenue.

Although the amount of sanitary flow entering Leominster is more than the amount of flow entering Fitchburg, the reduction of the IMA amount with Fitchburg due to the "capacity not utilized" clause means that more capacity is available with Leominster than Fitchburg. Based on the above sanitary flow estimates, Lunenburg is currently using approximately 46 percent of its IMA capacity with Fitchburg, but only 11 percent of the capacity under the Leominster IMA.

2.6.9.1 I/I Estimates for Existing Collection System

The flows listed above are based on the estimated wastewater generation at the various parcels which are currently connected to the existing collection system. However, these amounts do include flows which enter the collection system via infiltration or inflow. Because the Town currently reports flow conveyed to Leominster and Fitchburg based on water usage instead of actual metered wastewater flow, and no separate I/I assessment studies have been performed, the amount of I/I flow entering the system is unknown at this time.

In general, the amount of I/I entering a wastewater collection system is highly variable, dependant on many factors including the age of the system, type of pipe used in the system, depth to groundwater, and the existence of any direct or indirect connections between the wastewater collection system and the storm drainage system. In order to estimate the amount of I/I flows in the existing collection system, the total length of pipe was obtained by examining the as-built plans from the construction of the collection system. While the majority of the collection system in Lunenburg is less than 10 years old, which is considered fairly young for a collection system age, there are portions of the system in the Whalom area and which are approximately 70 years old. Due to advancements in the types of materials made over time, modern systems are much less likely to allow I/I into the system than older pipes. As such, we differentiated between newer pipe (ductile iron and PVC installed in the past 10 years) and the older pipe (vitrified clay installed in the 1930s) in the collection system to obtain a more realistic estimate. To estimate the amount of I/I flow, we used the DEP recommended design value of 500 gpd/inch diameter-mile for “design year” I/I rates for newer pipe, and the DEP threshold value for I/I studies of 4000 gpd/inch diameter-mile for the older sections of the collection system. The results are summarized in Table 2-25.

TABLE 2-25
INFILTRATION/INFLOW ESTIMATES

PIPE	DESTINATION CITY	LENGTH (MILE)	I/I FLOW (GPD)
8” Diameter, “New”	Fitchburg	0.94	3,800
10” Diameter, “New”	Fitchburg	1.93	9,600
FITCHBURG TOTAL			13,400
8” Diameter, “New”	Leominster	9.04	36,200
10” Diameter, “New”	Leominster	0.25	1,300
12” Diameter, “New”	Leominster	0.38	2,300
18” Diameter, “New”	Leominster	2.80	25,200
10” Diameter, “Old”	Leominster	0.63	25,200
LEOMINSTER TOTAL			90,200

The table above shows that the amount of I/I flow may be significant. For the Leominster system, the amount of I/I flow entering the collection system is estimated to be greater than the amount of sanitary flow in the system. It is worth restating that these I/I flow totals are only estimates, based on industry standard rates for I/I generation. While I/I flows of this magnitude may or may not be present, it is prudent to consider the possibility of such flows in wastewater planning. Because I/I rates are variable, it is recommended that Lunenburg gather more information on the amount of actual flow in the system. At a minimum, the Town should monitor flow at the points along the Town border where the wastewater collection system connects to the Fitchburg and Leominster systems.

2.6.10 Additional Betterment Connections

While the above discussion identified the amount of flow currently being conveyed to Fitchburg and Leominster, it is important to also identify future increases in sanitary flow due to growth. Properties along the sewer line were assessed betterment fees as part of the construction of Phase I sewers. Any property which has been assessed and paid a betterment is allowed to tie into the sewer. Using data provided by the Town, the increase in sanitary flow based on the connection of all bettered properties was estimated. Additionally, any proposed developments in sewered areas were added to estimated future flows, to see what impact these developments would have on the overall flow.

The amount of potential additional sanitary wastewater flow to Fitchburg was calculated to be just over 36,000 gpd. Of this, approximately 31,000 gpd would come from two large proposed developments: Tri-Town Landing on Summer Street and Highfield Village at 361 Massachusetts Avenue. The remainder of the flow would come from various residential and small commercial properties within the sewered area which drains to Fitchburg.

Adding this potential future sanitary flow to the existing sanitary flow which is currently conveyed to Fitchburg brings the total to 73,000 gpd. This leaves just 7,000 gpd in spare capacity under the current IMA with Fitchburg, which could limit additional connections to be served by sewers which drain to Fitchburg. For example, if an additional one hundred 3-bedroom homes were connected to sewers which drain to Fitchburg, the amount of flow would be almost the total allowable flow under the current IMA. Furthermore, if the I/I estimates above for the collection system which drains to Fitchburg are accurate, the I/I total of just over 13,000 gpd, combined with the sanitary total of 73,000 gpd would exceed the amount allowable under the IMA.

The amount of potential additional sanitary wastewater flow which would be conveyed to Leominster was calculated to be 174,000 gpd, which would bring the total amount of sanitary flow to Leominster to 230,000 gpd. Approximately 43 percent of this potential future total is from single-family homes which have paid a betterment, but have not yet connected to the existing sewer line. The remainder of the flow is largely the result of large developments in the sewered area which drains to Leominster. These developments include: Emerald Place at Lake Whalom; Lunenburg Village, at 250 Whalom Road; Lunenburg Estates, at 1229 Massachusetts Avenue; and the Stone Farm Estates at 748 Massachusetts Avenue. Another significant contributor is the approved sewer extension to the Meadow Woods Mobile Home Park at 1790 Massachusetts Avenue, which has been approved to tie into the existing sewer to alleviate public health concerns.

This evaluation shows that the bettered properties and currently planned developments, the sanitary flow to Leominster could increase by over 300 percent. Factoring in the I/I flow estimates would result in a total flow to Leominster of 320,000 gpd. However, due to the amount of capacity left in the IMA, even with this increase the total amount of flow would only be to 64 percent of that allowed. A summary of the flows generated in the Fitchburg and Leominster drainage areas is below in Table 2-26:

TABLE 2-26
SUMMARY OF WASTEWATER FLOWS

Sewered Areas	Connected	Unconnected bettered	Total
Residential Flows to Fitchburg	13,000	34,000[1]	47,000
Commercial/Industrial Flows to Fitchburg	24,000	2,000	26,000
I/I Flows to Fitchburg (estimated)	13,000	0[2]	13,000
TOTAL Flows to Fitchburg	**50,000**	**36,000**	**86,000**
Residential Flows to Leominster	39,000	165,000[3]	204,000
Commercial/Industrial Flows to Leominster	9,000	9,000	18,000
School Flows to Leominster	8,000	0	8,000
I/I Flows to Leominster (estimated)	90,000	0[2]	90,000
TOTAL Flows to Leominster	**146,000**	**174,000**	**320,000**

[1] Includes 31,000 gpd of sanitary flow from the Highfield Village and Tri-Town Landing proposed developments
[2] Assumes no significant extensions to the collection system
[3] Includes 89,000 gpd of sanitary flow from the Lunenburg Village, Lunenburg Estates, Emerald Place, Stone Farm Estates, and Hollis Hills proposed developments, and the connection to Meadow Woods Trailer Park

It should be noted that the projected increased flows do not include any flows from "change of use" at individual parcels of land. For example, if an existing single-family home were to be subdivided into several lots, or changed to commercial use, the increase in flows could be even higher. Even within existing commercial zones, there is the possibility of increased flow from the same parcel if the type of business changes. A 4,000 square foot office building would generate 300 gpd of sanitary wastewater flow, according to Title 5. If that same 4,000 square foot building were converted to a 100-seat restaurant, the sanitary flow generated wou ld jump to 3,500 gpd. Furthermore, if the building were converted to a laundromat with 25 washing machines, the flow would increase to 10,000 gpd. It is difficult to predict where these types of "change of use" may occur. Therefore, it should be noted that the possibility exists that the future flow from existing bettered parcels could be even larger than the amounts predicted.

With this in mind, we examined the total flow currently generated by commercial properties connected to the sewer. The commercial flows currently connected to the sewer are 24,000 gpd to the Fitchburg system, and 9,000 gpd to the Leominster system. If these flows were to increase by 50 percent over the current amounts, there would be only a slight increase in the overall amount of flow to Leominster. However, due to the concentration of commercial properties in the Lower Massachusetts Avenue area, which is connected to the Fitchburg system, a similar increase would have a significant impact on the amount of capacity remaining under the existing IMA.

SECTION 3

PROBLEM IDENTIFICATION

3.1 ON-SITE WASTEWATER DISPOSAL

The Town of Lunenburg has seen a significant number of compliance difficulties for on-site wastewater disposal systems since the implementation of the revised Title 5 regulations on March 31, 1995. Many of the systems in town were constructed prior to the adoption of the 1978 Title 5 environmental code. The local Board of Health (BOH) is the governing body that deals with Title 5 compliance. The Title 5 system failure criteria for on-site wastewater disposal systems are:

- Backup of sewage into facility or system component,
- Discharge or ponding of effluent (breakout) to the surface of the ground or surface waters,
- Static liquid level in the distribution box above outlet invert,
- Clogged on-site wastewater disposal system or cesspool,
- Liquid depth in cesspool is less than 6" below invert or available volume is less than half of the daily flow,
- Required pumping of the system more than 4 times in the last year not due to clogged or obstructed pipe(s),
- System is below high ground water elevation,
- System is within 100 feet of a surface water supply of tributary to a surface water supply,
- System is within a Zone I of a public well,
- System is within 50 feet of a private water supply well,
- System is within 50-100 feet of a private water supply well and does not meet EPA guidelines, and
- System is a cesspool serving a facility with a design flow of 2,000-10,000 gpd.

Generally, failing on-site systems that have outlived their design life are not indicative of a site that is unable to support a conventional Title 5 system. In most cases, a system rehabilitation or system replacement would result in a successful disposal system in compliance with current Title 5 regulations. However, failing systems that have not outlived their design life, and show evidence of breakout, backup, clogging, etc, may be indicative of a site that is unable to support a conventional Title 5 system. On-site systems that are located within the designated setback limits for public water supplies or private wells are regarded as public health failures by the BOH due to the potential negative health impacts associated with a failing on-site wastewater disposal system.

According to the BOH, there are four factors that generally indicate an area of concern for the use of conventional Title 5 on-site wastewater disposal systems: 1.) groundwater elevation (seasonal high), 2.) percolation rate, 3.) lot size, and 4.) slope of the land. Each factor varies considerably throughout town and does not constitute an unacceptable site on its own. For example, certain areas of town that have a perched water table in some portions of the lot can still support a conventional on-site disposal system because of large lot sizes. It is the combination of multiple factors that generally indicates an area of concern.

The cost of bringing a site into compliance with Title 5 regulations can be significant. In some areas, small lot size does not allow for the use of a conventional Title 5 on-site wastewater disposal system. In order to bring these sites into compliance with Title 5, the owners can construct mounded systems and/or Innovative and Alternative (I/A) systems. However, the cost of these systems can be excessive for construction, operation, and maintenance to the point that the homeowner may have difficulty affording the upgrade.

3.2 EXISTING WASTEWATER COLLECTION SYSTEM

3.2.1 Infiltration/Inflow (I/I)

Infiltration/Inflow (I/I) is the occurrence of stormwater or groundwater entering into municipal wastewater collection systems. The Whalom area collection system is the only area in Lunenburg that is known to have I/I problems. The network of sewers serving a portion of the

Whalom area was installed around 1930 by the City of Leominster. In 1979, American Consulting Services concluded the 10-inch sewer serving the Whalom area has excessive I/I. The report that was completed for Leominster estimated I/I to be 10 gallons per minute, or 14,000 gallons per day.

As part of the Phase I sewer construction, the old sewer servicing the Whalom area was abandoned at Electric Avenue. The properties to the west of Electric Avenue were connected to the new sewer system. The properties to the east of Electric Avenue remain connected to the old sewer. Leominster is attempting to reduce I/I in its collection system. Although Leominster reports that they have taken steps to reduce I/I citywide, it is unknown whether this specific line has been modified to reduce I/I.

However, based on the relatively young age of this system (approximately 10 years) it is assumed that there are no significant I/I flows. There have been no studies performed to assess I/I amounts in the collection system which is tributary to Fitchburg. It is difficult to determine if I/I is likely occurring in significant amounts in this system, as there are no means of measuring actual flow unless the Massachusetts Avenue flow meter were replaced.

3.2.2 CSOs/SSOs

Combined sewer overflows (CSOs) occur when combined sewers (i.e. stormwater and wastewater in the same pipe) become surcharged during precipitation events. All sewers in Lunenburg are "separated", meaning that stormwater is conveyed in a separate pipe network, not "combined" with the wastewater system. As such, there are no combined sewer overflows in the town of Lunenburg.

Sanitary sewer overflows (SSOs) occur in separated wastewater collection systems when the system becomes overloaded, often due to large amounts of I/I. Pressure in the collection system is relieved by allowing wastewater to escape to a receiving water, preventing the sewer system from backing up into homes or businesses. There are no known or suspected SSOs in the Town of Lunenburg's existing wastewater collection system. SSOs often occur due to old, leaking pipes allowing I/I into the system. Due to the relatively young age of the majority of

Lunenburg's system, large amounts of I/I would not be expected. SSOs can also occur due to a buildup of solids, rags, and fats, oils and grease in the collection system, which can cause blockages. Routine maintenance and cleaning/flushing of the collection system is recommended as it can reduce the chances of such buildups.

3.2.3 Sewer Expansion Capacity

A review of the existing wastewater collection system, including the pumping stations, was conducted to a capacity analysis. The review found that the existing collection system is able to adequately serve the existing flows. Many of the pump stations were designed to accommodate larger pumps with additional capacity, to allow for potential future expansion of the system. Pipe capacity at key points in the system is sufficient, as would be expected in a new system such as Lunenburg's.

3.3 WASTEWATER TREATMENT AND EFFLUENT DISPOSAL

3.3.1 Future Limits

As discussed in Section 2, the current flow limits under the two active IMAs are approximately 80,000 gpd for flow to Fitchburg, and 500,000 gpd for flow to Leominster. The IMAs do not contain any further clauses for modifying the flow amount to either municipality, meaning that barring any renegotiation, these flow limits will be in place until the IMAs expire in 2014 and 2019 respectively. As discussed in Section 2, the 80,000 gpd limit for flows discharged to Fitchburg will limit the possibility of any expansion of this collection system, as bettered flows will approach this allowable total. The IMA with Fitchburg is included as Appendix I and the IMA with Leominster is included as Appendix J.

3.3.2 Agreements - Status of Possible Changes

According to conversations with representatives of the Town of Lunenburg and the City of Fitchburg, preliminary discussions have taken place regarding a renegotiation of the IMA between the two municipalities. This renegotiation would increase the allowable flow from 80,000 gpd to the original capacity, prior to enforcement of the "capacity not utilized" clause, of 500,000 gpd. A key factor in this renegotiation will be the cost of the replacement of the sewer under John Fitch Highway. As discussed in Section 2, this sewer, which carries all of the flow from Lunenburg to Fitchburg, is at capacity and in poor structural condition.

To date, there have not been any discussions between Lunenburg and the City of Leominster regarding expansion of the IMA. The City of Leominster DPW Director was contacted regarding the capacity at Leominster's Wastewater Treatment Facility, and the possibility of increasing the amount of flow allowed under the IMA. According to the DPW Director, the City of Leominster is attempting to remove flow from their system by reducing I/I and other extraneous flows, and would not be amenable to expanding the IMA flow amount at this time.

3.4 FORECASTS OF FLOWS

Analysis of the wastewater flows discussed in Section 2 examined the existing flows, and the increase in flows which would be seen if all recently "bettered" properties were connected to the wastewater collection system. This section will look further at the impacts on wastewater flows due to growth within the Town.

It should be noted that all of the following flow forecasts are based on the average daily flow. Peaking factors to determine peak daily flow and maximum instantaneous flow will be developed in Phase II of the CWMP to enable approximate sizing of the different treatment options.

3.4.1 Study Area Development

The forecast of flows was estimated based on areas of the town described as "study areas"[1]. The town of Lunenburg was subdivided into 24 study areas based on a number of qualifying factors. Watershed sub-basins, zoning, lot size and geographic location were the major determining factors in establishing the study areas. All conservation, municipal, federal and state lands were delineated and excluded from the areas of study. In addition, properties that are currently connected to the sewer and properties that were bettered for sewer connection were also removed from the assessment.

[1] Glossary

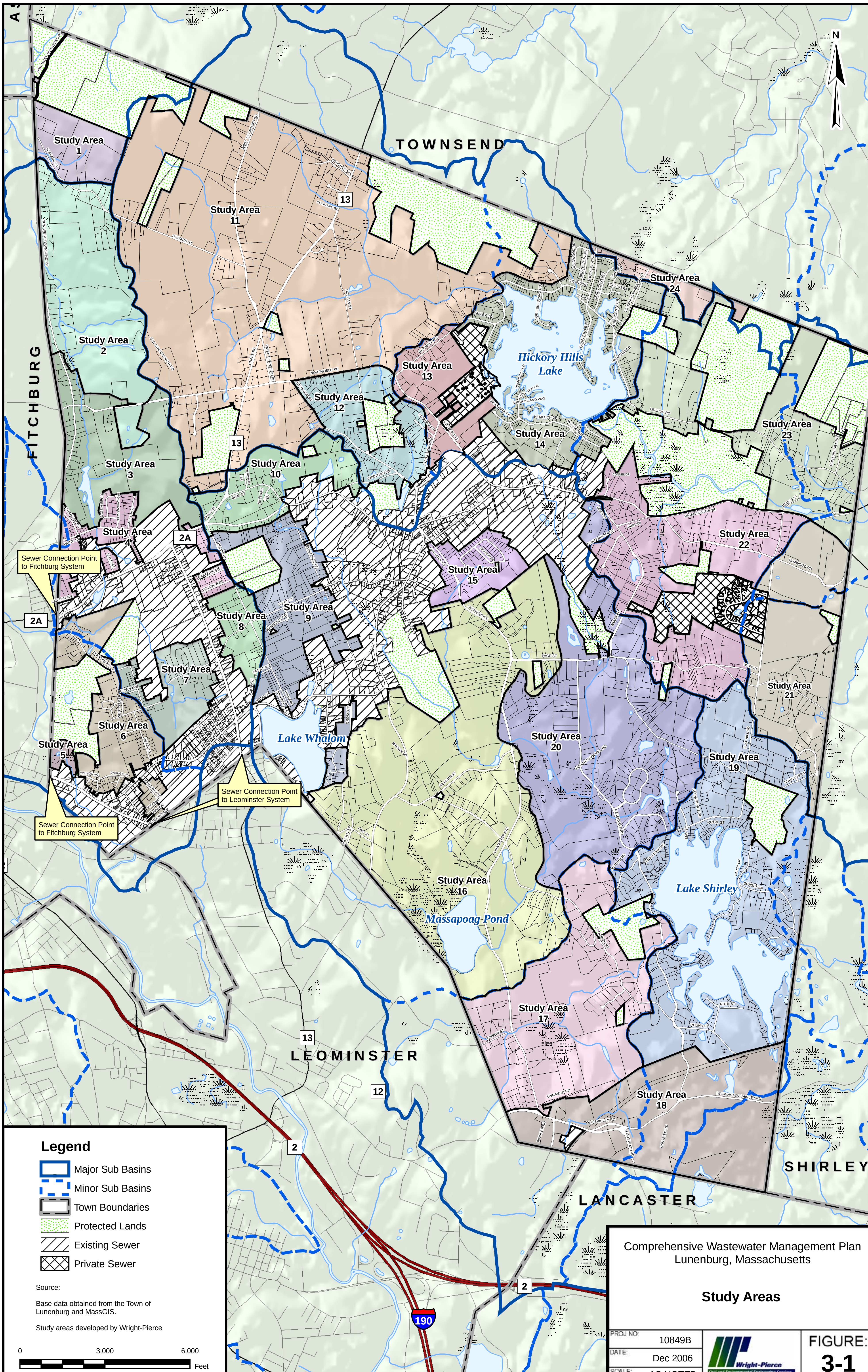
The primary criterion for the development of study areas were the watershed major sub-basin boundaries. After delineating the watershed sub-basins, the Town zoning map was overlaid to keep study areas within Town assigned and approved zoning districts. This made it possible to separate and analyze residential land use patterns from commercial and industrial properties.

Major physical properties of the Town, such as roadways and property lines, were also helpful in outlining boundary lines between study areas. With the combined use of these factors, we were able to establish study areas of similar characteristics and land use patterns for the entire Town that will be further analyzed to determine those areas that do not adequately provide proper sanitation, environmental protection, or growth management. The study areas are depicted in Figure 3-1.

3.4.2 Potential Development

Developments in sewered areas which have been officially proposed to the Town were included in the calculation of projected future wastewater flows. While not all of these developments have been approved, it is appropriate to consider the impacts of these developments for planning purposes.

It should also be recognized that a number of factors make further development in the sewered areas possible. One such factor is the simple presence of the sewers. Sewers allow larger scale, more dense development, due to the fact that wastewater does not need to be disposed of on-site. Another factor which encourages development in Lunenburg's sewered areas is the transportation access. These areas have close proximity to highways such as Route 2, as well as access to the MBTA Commuter Rail. Therefore, it is possible that future growth may be concentrated in the sewered areas of Lunenburg.


TOWNSEND
FITCHBURG
LEOMINSTER
LANCASTER
SHIRLEY
N
Study Area 1
Study Area 2
Study Area 3
Study Area 4
Study Area 5
Study Area 6
Study Area 7
Study Area 8
Study Area 9
Study Area 10
Study Area 11
Study Area 12
Study Area 13
Study Area 14
Study Area 15
Study Area 16
Study Area 17
Study Area 18
Study Area 19
Study Area 20
Study Area 21
Study Area 22
Study Area 23
Study Area 24
Hickory Hills Lake
Lake Whalom
Lake Shirley
Massapoag Pond
Sewer Connection Point to Fitchburg System
Sewer Connection Point to Leominster System
Sewer Connection Point to Fitchburg System
2A
13
12
2
190
Legend
Major Sub Basins
Minor Sub Basins
Town Boundaries
Protected Lands
Existing Sewer
Private Sewer
Source:
Base data obtained from the Town of Lunenburg and MassGIS.
Study areas developed by Wright-Pierce
0
3,000
6,000
Feet
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts
Study Areas
PROJ NO: 10849B
DATE: Dec 2006
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE: 3-1

3.4.3 Future Wastewater Flows

To estimate future wastewater flows, we examined population growth projections for the Town to see how the characteristics of the Town could change over time. The long-term impacts of growth and development are analyzed by looking at the "Theoretical Buildout" of the town. "Theoretical Buildout" is calculated by examining land area and zoning requirements to determine the amount of growth which could theoretically occur in Lunenburg over a long period of time. By using the zoning requirements, the maximum number of subdivided lots can be calculated for land areas in the Town. Therefore, for areas zoned as Residence A and Outlying, the theoretical buildout would be one household per 40,000 sf of land area. It should be noted that theoretical buildout estimates also take into account the presence of delineated wetlands and conservation lands in an area, and subtract this area from the overall estimate for future growth. Additionally, a "utilization factor" for the land is often used to account for odd-shaped lots and requirements for additional roadways within a land area.

Preliminary review of the EOEA estimates showed that by the time the Town reaches theoretical buildout, the population of Lunenburg is expected to more than double as compared to the 2000 Census, and the water use increased by a factor of almost five as compared to 2000 water use. It is unrealistic to expect that growth on such scale could occur within the 20-year planning period of the CWMP (2006 - 2026). Therefore, it was decided to estimate two flow amounts: the amount of flow which could be realized in year 2026; and the amount of flow which could be realized at the theoretical buildout of the town.

It is important to note that the following projections include increased flows generated only within the existing sewered areas of the Town. Flows from areas currently served by on-site systems are discussed in Section 3.4.4.

3.4.3.1 Year 2026 Flows

To calculate the future wastewater flows for the end of the study period in year 2026 we first estimated population increase in the Town for the 20-year planning period. As shown in Chapter 2, the projected population from the EOEA study in Year 2025 is expected to be 11,133. This gives a 20-year growth rate of 16.2 percent over the 2005 estimated population. This EOEA growth rate was also used as a baseline by Wright-Pierce to estimate the projected population growth between 2006 and 2026. Because wastewater is generated largely based on the residential population and the commercial properties which service the population, we assumed that the townwide wastewater flows will also increase by the same percentage. This includes flows which are collected by the Town's sewer system, as well as flows which are treated by conventional on-site Title 5 systems. For the reasons stated above, it is reasonable to assume that a significant portion of the Town's overall growth will occur in the area of the Town which is already sewered. Therefore, it is projected that wastewater generation within the sewered areas will increase by 32.4 percent, or double the baseline growth rate projected by EOEA. This value is an estimate to account for the additional growth possible as a result of the presence of a wastewater collection system. Lunenburg has seen an increase in the number of proposed residential units which has largely been concentrated in the sewered areas. It is reasonable to assume that this trend will continue in the future. Furthermore, it accounts for the possibility of additional 40B development (beyond those projects already presented to the Planning Board) in the existing sewered area. Given the proximity of the existing sewered area to transportation and commercial districts, it is assumed that the majority of future large scale developments like 40B projects (or additional town-approved 40R projects) will occur in the existing sewered area. Town-wide population projections are discussed in greater detail in Section 3.4.5.

Adding this factor of growth to the "base-line sanitary flow", or sanitary flow possible under existing betterments (73,000 gpd for Fitchburg and 230,000 gpd for Leominster, as presented in Chapter 2) would result in total flows of 97,000 gpd to Fitchburg, and 304,000 gpd to Leominster. This flow amount would mean that Lunenburg was exceeding its allowable flow under the existing IMA with Fitchburg, and would be utilizing 61 percent of it's allowable capacity with Leominster. Further, adding the estimated I/I amounts for the existing system calculated in Chapter 2 would result in total flows of 110,000 gpd to Fitchburg and 394,000 gpd to Leominster.

3.4.3.2 Theoretical Buildout

At the projected "Theoretical Buildout" of the Town (based in EOEA estimates), the population would increase to 22,318, a 132.8 percent increase over the 2005 population. Because this growth would occur town-wide, with each parcel being utilized to the maximum possible extent allowed under current zoning, it is appropriate to project the existing sewered area to grow at the same rate as the rest of the Town. For the sewered areas of Lunenburg, we again used the EOEA buildout growth rate as a baseline estimate. This growth would result in sanitary wastewater flows of 170,000 gpd to Fitchburg and 535,000 gpd to Leominster. This exceeds the amount allowable under the IMA's to both Fitchburg and Leominster.

The EOEA projections for water use are considerable – it projects water use at theoretical buildout to be 2.57 million gallons per day (mgd), almost 5 times the 2000 usage rate of 0.52 mgd. If wastewater flow were to increase at the same rate as water demand, the resulting flows would be 361,000 gpd to Fitchburg and 1.14 mgd to Leominster. This is largely due to their projected growth of the office park/industrial district in southeastern Lunenburg.

The amount of flow from the existing sewered areas is summarized in Table 3-1.

3.4.4 Flow Estimates in Study Areas

To estimate the amount of wastewater generated in each of the study areas, we first used the GIS software to group the existing parcels of land in the assessor's database by study area. Other data imported from the assessor's database included the zoning for the parcel, the number of bedrooms (if the parcel currently has a residential unit on it), and the total acreage for the parcel. With this data, we were able to estimate the existing sanitary wastewater generation and the amount of sanitary wastewater generated under theoretical buildout. The rationale for the estimates for each type of parcel is discussed below.

TABLE 3-1
SUMMARY OF SANITARY FLOW PROJECTIONS FOR SEWERED AREAS

	To Fitchburg (gpd)	To Leominster (gpd)
Existing Sanitary Flows Connected to Sewer	37,000	56,000
Additional Sanitary Flows Due to Unconnected Betterment Properties	5,000	85,000
Additional Sanitary Flows Due to Proposed Developments	31,000	89,000
Total Baseline Sanitary Flows	73,000	230,000
Year 2026 Estimated Sanitary Flows (32% increase of baseline flows)	97,000	304,000
Theoretical Buildout Sanitary Flow (132% increase from baseline flows)	170,000	535,000
Allowable Flow Under Existing IMA	80,000	500,000

3.4.4.1 Theoretical Buildout in Residential Zoned Areas

As discussed in Chapter 2 of the report, the existing residential properties in Lunenburg average 57 gallons of water usage per bedroom per day. This rate was also applied to the existing residential properties in the unsewered areas of the Town, to determine the amount of wastewater currently generated in each Study Area. To determine "theoretical buildout" flows, it was assumed that for each lot in the Study Area, the maximum amount of homes allowed under existing acreage requirements would be built on the parcel, including parcels with existing residential units. This corresponds to one home per acre in Residence A and Outlying districts, and one home per two acres in Residence B districts. The properties at "theoretical buildout" were assumed to have an average size of 3.5 bedrooms per unit. This is slightly higher than the existing average household of just over 3 bedrooms per unit, to reflect development trends towards larger homes. For this estimate, a "utilization factor" of 0.84 was applied to the available land area to account for frontage requirements, odd lot shapes, and other miscellaneous requirements for parcel development. This factor was taken from the EOEA buildout analysis for the Town.

Parcels which were identified as State- or Town-owned conservation land were omitted from the analysis. The wastewater flow generated at these parcels was assumed to be zero for each scenario. Additionally, lots with large percentages of wetlands (as identified by MassGIS) were scaled back to account for the fact that wetlands would not be developable.

3.4.4.2 Theoretical Build out in Commercial/Industrial Zoned Areas

Although almost 97 percent of the parcels in unsewered areas are currently zoned as residential, there remain some parcels of land which are zoned for commercial, industrial, or office park use which are not served by the existing wastewater collection system. For these parcels, the amount of sanitary wastewater generated was estimated as follows: For existing flows, an amount of 250 gallons per day was assumed. This would allow for a low density, small office use of the parcel, which would be conducive to a Title 5 system. Based on our review of the parcels zoned for commercial/industrial use which were not served by the existing sewer, this appeared to be the case, as the majority of the parcels are currently small retail or commercial businesses. For "theoretical buildout", it was assumed that all commercial/industrial parcels in the Town would be developed to beyond the density seen in the existing sewered areas. In these existing commercial and industrial-zoned areas of the Town served by the wastewater collection system, the parcels average a sanitary wastewater generation rate of 118 gpd per acre of land zoned as commercial or industrial. For "theoretical buildout" analysis, we assumed that this rate would double. In other words, the existing commercial districts along Massachusetts Avenue and in the Whalom district would become twice as densely built over time. This "theoretical buildout" estimate also shows the effects which could conceivably be seen if the large (100+ acres) lots in southeast Lunenburg were developed to a higher density business and industrial use.

The flows in the Table 3-2 show the sanitary wastewater flows under "theoretical buildout" conditions, which corresponds to the development of the land to the maximum extent possible under current zoning. Given the amount of growth it would take for this situation to be realized, it is unrealistic to expect this "theoretical buildout" scenario occurring during the twenty-year planning period of this plan. Below, we will discuss the methods used to scale back these flows to a level which could reasonably be expected in year 2026, the end of the study period.

3.4.4.3 Study Period (2026) Flows

To calculate the buildout which would be expected to be seen during the planning period, we used the 16.2 percent growth projection from the EOEA Buildout report. Rather than apply this percentage to the existing flow from each of the parcels, we used the full buildout flow projections to determine which parcels had the greatest potential for growth over the planning period. For each study area a "growth factor" was calculated by dividing the additional flow at theoretical buildout for that study area by the total additional flow for all study areas. Study areas with more potential for growth had higher growth factors than study areas which are already well developed. Growth factors for each study area are listed in Table 3-3. For example, Study Area 18, which includes the Office Park/Industrial zone in South Lunenburg, has a greater potential for future growth than do Study Areas 6 & 7, which include the Baker Station area. This is due to the fact that the Baker Station area is closer to its full buildout potential than other areas of Town. The total projected increase in wastewater flows (16.2 percent of current flows) was applied proportionally over the Study Areas to determine the expected flow at the end of the 20-year planning period (2026). The results are shown below in Table 3-4.

A summary of all current and future sanitary wastewater flows is presented in Table 3-5. Many of the flows listed in Table 3-5 were developed in the discussion in Chapter 2 of this report. Further discussion of these flows can be found in Chapter 2.

TABLE 3-2
EXISTING AND THEORETICAL BUILDOUT SANITARY WASTEWATER FLOWS

Area #	Existing Residential Units	Existing Sanitary Flows (gpd)	Residential Units at Theoretical Buildout	Theoretical Buildout Sanitary Flows (gpd)
1	17	3,100	178	35,400
2	34	5,400	635	126,100
3	30	5,000	102	20,500
4	138	24,900	212	49,900
5	0[1]	1,000	0[1]	2,700
6	181	36,500	284	85,600
7	56	9,900	91	18,400
8	25	4,400	83	16,600
9	205	34,600	374	75,800
10	67	20,600	255	64,900
11	216	42,000	962	233,100
12	75	13,900	145	29,300
13	64	12,900	461	92,200
14	475	73,300	849	170,000
15	85	16,200	188	38,400
16	159	32,500	541	105,600
17	69	14,200	233	47,400
18	7[2]	7,200	59[2]	190,400
19	445	76,600	755	158,100
20	191	35,600	398	80,000
21	53	10,400	390	80,400
22	180	34,000	490	98,900
23	85	16,200	331	70,900
24	9	1,600	26	5,200
TOTAL for non-sewered areas	2,866	532,000	8,042	1,895,000
Sewered Areas Presently Connected	325[3]	93,000	4,230	703,000
Sewered Areas Not Presently Connected	650[3]	89,000	* included above	* included above
Proposed Developments in Sewered Areas	842	120,000	* included above	* included above
TOTAL without Proposed Developments	3,841	714,000	N/A[4]	N/A[4]
TOTAL with Proposed Developments	4,683	834,000	12,272	2,598,000

1 - Study Area No. 5 consists of commercial properties in the Summer Street area. There are no residential properties within this study area.

2 - Study Area No. 18 is largely made up of the Commercial/Industrial Park zoned area in southeast Lunenburg. Therefore a large portion of this projected flow is non-residential.

3 - A significant portion (approximately 35%) of the sanitary flow from properties already connected comes from non-residential sources. The vast majority (93.5%) of the unconnected, but bettered properties in the existing sewered area are residential.

4 - It is assumed that the proposed developments will be constructed at the time of theoretical buildout, therefore they are included in the overall total.

TABLE 3-3
GROWTH FACTORS FOR STUDY AREAS

Study Area	Additional Sanitary Flow at Theoretical Buildout (gpd)	Growth Factor
1	32,300	2.4
2	120,700	8.9
3	15,500	1.1
4	25,000	1.8
5	1,700	5.1
6	49,100	3.6
7	8,500	0.6
8	12,200	0.9
9	41,200	3.0
10	44,300	3.2
11	191,100	14.0
12	15,400	1.1
13	79,300	5.8
14	96,700	7.1
15	22,200	1.6
16	73,100	5.4
17	33,200	2.4
18	183,200	13.4
19	81,500	6.0
20	44,400	3.3
21	70,000	5.1
22	64,900	4.8
23	54,700	4.0
24	3,600	0.3
Total	1,363,800	100.0

TABLE 3-4
PROJECTED STUDY PERIOD SANITARY WASTEWATER FLOWS

Area #	Existing Residential Units	Existing Sanitary Flows (gpd)	Year 2026 Residential Units	2026 Sanitary Flows (gpd)	Percent Growth
1	17	3,100	28	5,100	65%
2	34	5,400	82	13,000	141%
3	30	5,000	36	6,000	20%
4	138	24,900	146	26,500	6%
5	0[1]	1,000	0[1]	1,100	10%
6	181	36,500	195	39,600	8%
7	56	9,900	59	10,400	5%
8	25	4,400	29	5,200	18%
9	205	34,600	221	37,200	8%
10	67	20,600	76	23,400	14%
11	216	42,000	279	54,100	29%
12	75	13,900	80	14,900	7%
13	64	12,900	89	17,900	39%
14	475	73,300	513	79,400	8%
15	85	16,200	93	17,600	9%
16	159	32,500	181	37,100	14%
17	69	14,200	79	16,300	15%
18	7[2]	7,200	18[2]	18,800	161%
19	445	76,600	476	81,800	7%
20	191	35,600	206	38,400	8%
21	53	10,400	75	14,800	42%
22	180	34,000	202	38,100	12%
23	85	16,200	104	19,700	22%
24	9	1,600	10	1,800	13%
TOTAL for study areas	2,866	532,000	3,277	618,000	16.2%
Sewered Areas Presently Connected	325[3]	93,000	2,405	400,000	32.4%
Sewered Areas Not Presently Connected	650[3]	89,000	* Included above	* Included above	
Proposed Developments in Sewered Areas	842	120,000	* Included above	* Included above	
TOTAL without Proposed Developments	3,841	714,000	N/A[4]	N/A[4]	N/A[4]
TOTAL with Proposed Developments	4,683	834,000	5,682	1,018,000	22.0%

1 - Study Area No. 5 consists of commercial properties in the Summer Street area. There are no residential properties within this study area.
2 - Study Area No. 18 is largely made up of the Commercial/Industrial Park zoned area in southeast Lunenburg. Therefore a large portion of this projected flow is non-residential.
3- A significant portion (approximately 35%) of the sanitary flow from properties already connected comes from non-residential sources. The vast majority (93.5%) of the unconnected, but bettered properties in the existing sewered area are residential.
4 - It is assumed that the proposed developments will be constructed by Year 2026, therefore they are included in the overall total.

TABLE 3-5

GRAND SUMMARY OF WASTEWATER FLOWS

Flow Component	Existing[1]	Year 2026	Theoretical Buildout
Existing Sewered Areas			
Residential Sanitary Flows to Fitchburg	13,000	62,000	109,000
Unconnected Residential Sanitary Flows within the Fitchburg collection system area	2,600	0[3]	0[3]
Commercial/Industrial Sanitary Flows to Fitchburg	24,000	34,000	60,000
Unconnected Commercial/Industrial Sanitary Flows within the Fitchburg collection system area	1,900	0[3]	0[3]
I/I Flows to Fitchburg	13,000	13,000[2]	13,000[2]
Residential Sanitary Flows to Leominster	39,000	270,000	475,000
Unconnected Residential Sanitary Flows within the Leominster collection system area	81,000	0[3]	0[3]
Commercial/Industrial Sanitary Flows to Leominster	9,000	24,000	42,000
Unconnected Commercial/Industrial Sanitary Flows within the Leominster collection system area	9,000	0[3]	0[3]
School Sanitary Flows to Leominster	8,000	11,000	19,000
I/I Flows to Leominster	90,000	90,000[2]	90,000[2]
Total Flows for Existing Sewered Areas	291,000	504,000	784,000
Study Areas (non-sewered areas)			
Residential Sanitary Flows	507,000	577,000	1,613,000
Commercial/Industrial Sanitary Flows	25,000	41,000	282,000
Total Sanitary Flows	532,000	618,000	1,895,000
Town-wide Totals			
Residential Sanitary Flows	643,000	909,000	2,197,000
Commercial/Industrial Sanitary Flows	69,000	99,000	384,000
School Sanitary Flows	8,000	11,000	19,000
Total Sanitary Flows	720,000	1,019,000	2,600,000

[1] – Existing flows do includes proposed developments, or unconnected properties in the sewered areas.
[2] – I/I flows for Year 2026 and Theoretical Buildout assume no significant expansion of the existing collection system.
[3] – It is assumed that all unconnected properties within the existing sewered areas will connect by Year 2026.

Using the growth factors allowed us to account for the areas of town which have more potential for growth. For example, although the existing flows form study areas 2 and 8 are very similar (approximately 5,000 gpd), the projected year 2026 flow from Study Area 2 is more than double the predicted amount from Study Area 8. This is due to the higher growth potential in Study Area 2.

The sanitary flows listed in Table 3-4 will be used for planning purposes as the study further evaluates the needs and potential solutions for wastewater management in later phases of the CWMP. These sanitary flows are “average daily flows”, or the amount of flow expected to be generated, on average, over a period of a month or longer. During the development of alternatives in later phases of the CWMP, other flow quantities will be developed using “peaking factors” contained in TR-16. These include the maximum daily flow, which will be used to size items such as local treatment plants, and peak instantaneous flow, which will be used to size theoretical collection systems. Use of these higher flows is appropriate for development and evaluation of specific alternatives for wastewater management, in order to accurately assess the true size required for each alternative. Furthermore, analysis of the total capacity required for different alternative will require an estimate of the amount of I/I flow which would also be collected by the potential new system. This amount was estimated by analyzing the ratio of I/I flow to sanitary flow in the existing collection system in Lunenburg, and applying that ratio to each study area. The amount of I/I entering the existing system through “old” pipes, at the higher rate of infiltration, was neglected in this analysis due to the fact that any collection system constructed in the study areas would be new construction, so lower I/I rates would apply. The results are presented below in Table 3-6. These estimates are variable and will be further refined as each alternative for wastewater management is further developed in later phases of the CWMP. For example, some alternatives, such as implementation of a Septage Management Plan or installation of individual Innovative/Alternative (I/A) systems, would not generate any additional I/I, as these alternatives do not involve new collection systems. Discussion of the attributes and recommendations for the individual study areas are included in Chapter 4.

TABLE 3-6
PROJECTED YEAR 2026 FLOWS

Area #	Existing Sanitary Flows (gpd)	2026 Sanitary Flows (gpd)	Future I/I[1] (gpd)	2026 Total[2] Flow
1	3,100	5,100	3,800	8,900
2	5,400	13,000	9,800	22,800
3	5,000	6,000	4,500	10,500
4	24,900	26,500	19,900	46,400
5	1,000	1,100	800	1,900
6	36,500	39,600	29,700	69,300
7	9,900	10,400	7,800	18,200
8	4,400	5,200	3,900	9,100
9	34,600	37,200	27,900	65,100
10	20,600	23,400	17,600	41,000
11	42,000	54,100	40,600	94,700
12	13,900	14,900	11,200	26,100
13	12,900	17,900	13,400	31,300
14	73,300	79,400	59,600	139,000
15	16,200	17,600	13,200	30,800
16	32,500	37,100	27,800	64,900
17	14,200	16,300	12,200	28,500
18	7,200	18,800	14,100	32,900
19	76,600	81,800	61,400	143,200
20	35,600	38,400	28,800	67,200
21	10,400	14,800	11,100	25,900
22	34,000	38,100	28,600	66,700
23	16,200	19,700	14,800	34,500
24	1,600	1,800	1,400	3,200

1 – Existing I/I flows for Study Areas are zero, as there are no collection systems in these areas.

2 – Total flow is the sanitary flow plus the I/I flow.

3.4.5 Population Projection

To develop the wastewater flow estimates shown above, Wright-Pierce projected the growth which could be expected in the 20-year planning period of this study. The EOEA study and population projections were consulted and used as a baseline in some cases, however overall the population projections used to forecast the wastewater flows differed from the EOEA estimates.

Using the data contained in Table 3-4, it shows an additional 120,000 gpd in sanitary flows based on the proposed developments. This corresponds to 1,875 additional residents. In addition to these residents, we project 70,000 gpd in additional residential sanitary flows in the study areas, which corresponds to 1,094 residents. Finally, we add the projected residential growth in the existing sewered area, above and beyond the proposed developments. Using Table 3-5, the total growth in residential sanitary flows from these areas (not including the 120,000 gpd from the proposed developments) is 98,000 gpd, which corresponds to an additional 1,531 residents.

The sum of the growth from each of these components is 4,500 residents by the Year 2026, for a total population of 14,054 in Year 2026. This corresponds to a 47.1 percent growth in population as compared to the 2005 Lunenburg Town Report estimate of 9,554 residents. For comparison, the growth rate over the twenty-year period from 1980 through 2000 was 11.8 percent.

While this growth rate is significantly higher than the EOEA projected growth rate of 16.2 percent, we feel it is appropriate for a planning study, especially given the growth pressures which Lunenburg has experienced in recent years. For example, if all of the planned 40B and 40R projects go forward, the population increase of 1,875 residents corresponds with a 19.6 percent growth rate. These projects alone would exceed the EOEA projections, independent of any other development within the town.

3.5 GROUNDWATER QUALITY

The Lunenburg Water District gets 97 percent of its water supply from the wells located along Catacunamug Brook, east of Lancaster Avenue. The geology of the site indicates that the site lies within a narrow, north-south trending band of stratified drift. This formation of sand and gravel was deposited by glacial meltwater streams during the last glacial period, approximately 10,000 years ago. Deposition by water results in sorting of grain size and relatively low density which allows a good permeability for water.

The USGS Hydrologic Atlas indicates that the aquifer is bounded to the north and to the east and west by glacial till. Till consists of unsorted sediments from clay and silt to boulder in size. It is deposited directly by glacial ice typically resulting in a high density soil material. The wells are located in an aquifer with a high vulnerability to contamination due to the absence of hydrogeologic barriers (i.e. clay) that can prevent contaminant migration. The wells have Aqua-Mag added to sequester manganese in the raw water and provide corrosion control treatment.

3.6 SURFACE WATER QUALITY

3.6.1 Lake Shirley

Lake Shirley in Lunenburg is noted as being in a eutrophic state due to high phosphorus loading as well as having noxious and non-native plants and high turbidity. Bow Brook which discharges to Lake Shirley has one industrial NPDES permit for P.J. Keating, Co.

Lake Shirley has shown a wide range in algal and aquatic plant abundance and composition from one year to the next and over the span of approximately the past decade for which data has been collected. Algal abundance and water clarity are considered an impairment for normal recreational uses, including, swimming, boating and fishing.

During the summer of 2006, recreational use of the lake was severely impaired and safety for swimmers was jeopardized due to the poor clarity. Under conditions of algal blooms of this intense magnitude and long duration, short-term adverse effects on the lake’s fish and wildlife community would not be unusual.

The EPA 305(b) Assessment Information Year 2002 designated Lake Shirley as Partially supporting Fish, Shellfish, and Wildlife Protection and Propagation, and not supporting recreation, primary or secondary contact and aesthetics. The EPA classifications for this impairment were turbidity, and nuisance exotic species. The state impairment classifications were turbidity, non-native aquatic plants, and non-native fish, shellfish, and zooplankton species.

Phosphorous levels at both major inlets to Lake Shirley were about a factor of 10 greater in 2004 than 2003. The 2004 in lake phosphorous was also significantly higher than in 2003 and were at levels that would support abundant plant and algae growth. While there are no state standards for total phosphorus in either Massachusetts or New Hampshire, phosphorus is a significant concern because only a small increase in its concentration greatly influences plant growth, or overgrowth. Surface and groundwater flows are pathways for the transfer of land-sourced nutrients to surface waters. Fluxes of primary ecosystem structuring nutrients, nitrogen and phosphorus, differ significantly as a result of their hydrologic transport pathway, such as streams versus groundwater. In freshwater ecosystems and stream feed surface waters, nitrogen is highly retained during surface water transport as a result. Watersheds tend to release little nitrogen to fresh waters. In contrast, phosphorus, is readily transported through fresh water environments.

3.6.2 Hickory Hills

Hickory Hills Lake is noted for having elevated mercury concentrations in its largemouth bass. In August 2005, the results of the *E. coli* analysis indicate that there was one exceedance at Hickory Hills Lake. The EPA 305(b) Lists/Assessment Unit Information Year 2002 designated Hickory Hills Lake as impaired for aquatic life harvesting due to metals, and total toxics.

3.6.3 Mulpus Brook

Mulpus Brook sub-basin is currently under a medium level of stress. Looking ahead to 2020, the Mulpus Brook is projected to remain under a medium level of stress. This means that the net 7Q10 outflow from the sub-basin equals or exceeds the estimated natural low flow, 7Q10[*]. 7Q10 is the lowest consecutive 7 day streamflow that is likely to occur in a ten year period in a particular river segment.

3.6.4 Lake Whalom

In 2002, the EPA reported that Lake Whalom only partially supports fish, shellfish, and wildlife protection. The EPA classifies this impairment as due to nuisance exotic species. The MA DEP also classified this Lake as impaired due to non-native fish/shellfish/zooplankton species. The NRWA Association also reported that Lake Whalom is noted for having non-native plants.

[*] Glossary

In 2003 and 2006, the results of the *E. coli* analysis indicated there were peaks in *E. coli* counts at Lake Whalom Town beach exceeding the standard of 235 cfu[2]/100 ml.

3.6.5 Massapoag Pond

EPA 305(b) Lists/Assessment Unit Information Year 2002 designated the water status of Massapoag Pond as good. The report states that secondary recreational contact and aesthetics are fully supported. Other use designations were not assessed.

3.7 WASTEWATER FLOW AND GROWTH MANAGEMENT TOOLS

Future wastewater flow management is dependent on planned growth. The Town is working on ways to plan growth that will manage future wastewater flow. The Town of Lunenburg's planned growth goal is not to end growth, nor accelerate it, but rather to develop ways to manage it, and to keep it at a pace and level where Lunenburg is still able to protect the open spaces and natural resources, and the historical and agricultural integrity of the land and buildings. Lunenburg is working to solve the problems associated with existing development and on-site septic systems while at the same time not promoting sprawl or unchecked development in more rural, less dense areas of Town.

3.7.1 Bylaw Development

The introduction of sewer infrastructure in itself does not serve to promote or deny growth. The sewer infrastructure does allow for lots that were previously unbuildable according to Title 5 to be developed. Growth is managed through local zoning and bylaws. In order to legally identify the boundaries of and set policy relating to, sewer and septic overlays can be delineated. The overlay districts help to preserve the existing wastewater infrastructure capacity. The policies allow the Town to distinguish which properties have the right to connect to the municipal sewer system through a Sewer District Management Plan (SDMP) and which properties will be managed under a Septage Management Program (SMP).

[2] Acronym

3.7.2 Sewer District Management Plan (SDMP)

Under existing law, when a sewer line passes in front of a property, the Board of Health can mandate that the property be connected to the sewer. Conversely, the Town cannot reject an applicant's request to tie in. One method of managing wastewater connections may be to adopt a Sewer District Management Plan (SDMP). This plan outlines and selects the properties which offer the most benefit for the connection, in other words to be able to take a “checkerboard” approach to which properties get connected. It may be more effective to connect properties with high sewage volume, or those in close proximity to receiving waters than other properties, and to have some properties continue to rely on private on-site systems. To do so, the Town must have the ability to require certain properties to connect and to prevent others from connecting. This approach was successfully used in Provincetown, MA under similar special legislation.

3.7.3 Septage Management Plan (SMP)

Growth can be managed by continued use of conventional Title 5 systems. The goal of a Septage Management Plan (SMP) is to protect and maintain public health, ensure protection of surface and groundwater quality. The SMP can provide sustainability of the aquifers, maintain water resources as recreational, aesthetic and economic assets. SMP's are utilized in order to improve the environment and prevent its deterioration, preserve and retain local control of on-site wastewater disposal systems without regulatory intervention. The successful long-term sustainability of on-site wastewater disposal systems is dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts. It is the intent of a SMP to operate in conjunction with the Town’s municipal wastewater collection systems in the proper collection and disposal of wastewater.

The SMP may also include that recent changes to Title 5, allow for the installation of on-site disposal systems under certain circumstances, even if public sewer is available. “”…and particularly to promote recharge of stressed basins, improve low stream flow, or address other local water resource needs…”(310CMR 15.004 (3).

3.7.4 Sewer System Expansion Control Policy

A Sewer System Expansion Control Policy can be utilized to control wastewater flows so that the Town can stay within its allotted flow allowances set in the intermunicipal agreements or at the receiving wastewater treatment facilities. These policies can address issues such as the number of service connections allotted to large parcels of undeveloped land that have frontage on a sewer line in a designated area, connections to force mains, sewer service to back lots which do not have frontage on a street that has sewers, the possibility of establishments not in a designated sewer service area connecting into a gravity main that services a designated sewer area, sewer system extension outside areas not well suited for conventional Title 5 systems.

3.7.4.1 MGL Chapter 83, Section 3

Chapter 83, Section 3 of the General Laws of Massachusetts (MGL) allows a board of health to mandate a sewer connection on a property abutting a road in which public sewer is located. This section also requires the town to connect a property abutting such a road if the landowner requests service. In cases where treatment and/or disposal capacity is limited, the town needs the ability to deny sewer access to properties that can make use of Title 5 with reasonable variances, and thus create a so-called "checkerboard" system. When this situation has occurred in the past, towns have dealt with it through special legislations.

Title 5 allows a property owner to maintain their on-site system even if sewer runs adjacent to their property as long as the system can pass Title 5 and particularly in situations of recharge, low flow and water resources needs. On the other hand, Chapter 83 extends the right of a property owner to connect to the sewer if it is adjacent to their property. This legislative change by the Town must be incorporated for the Town to unequivocally deny access to the sewer. Furthermore, the legislative change allows the Town to design the sewer to only allow for selected properties

If a town develops a wastewater management plan that creates reserve treatment capacity for an area needing sewers, it could amend Chapter 83 Section 3 to reject applications from properties abutting the sewer system to preserve that reserve capacity for the purposes stated in the plan. If the Town does not move forward with the planned sewer system expansion in a timely fashion, say due to budgetary limitations, the town must be prepared to deal with the applications for service that were rejected, particularly if the lots in question are otherwise prime for development. Amending Chapter 83, Section 3 would allow a town to reject an applicant's request for sewer service, but it does not address the potential need to restrict the flow from existing services, such as through "redevelopment".

3.7.5 Planning with Massachusetts Housing Agencies

The Town of Lunenburg can work to manage wastewater flow by planning for "Smart Growth". Municipalities, such as Lunenburg, should continue to work with state planning and housing agencies to develop the required low-income housing options. The state of Massachusetts is working toward low-income development and "Smart Growth" state goals. The state standard is for communities to provide a minimum of 10 percent of their housing inventory as affordable. Once the housing requirements are met, then the municipalities can be more independent with planning for wastewater flows and growth. The state has several programs to allow for low-income housing development. The Town of Lunenburg has already worked with several of the following programs to plan for Smart Growth.

3.7.5.1 Local Initiative Program

The Local Initiative Program (LIP) is a state program that encourages the creation of affordable housing by providing technical assistance to communities and developers who are working together to create affordable homeownership opportunities for low- and moderate-income households.

3.7.5.2 Community Preservation Act

The Community Preservation Act (CPA) is a tool for communities to preserve open space, historic sites, and affordable housing. The Community Preservation Act is statewide enabling legislation to allow cities and towns to exercise control over local planning decisions, and provide new funding sources. Executive Order 418 and the Housing Certification process give special consideration to projects located in communities that are taking steps to address local affordable housing needs. This includes granting priority status for some discretionary funded state programs.

3.7.5.3 Chapter 40B

Chapter 40B is a state statute which enables local Zoning Boards of Appeals (ZBAs) to approve affordable housing developments under flexible rules if at least 20-25 percent of the units have long-term affordability restrictions. Also known as the Comprehensive Permit Law, Chapter 40B was enacted in 1969 to help address the shortage of affordable housing statewide by reducing unnecessary barriers created by local approval processes, local zoning, and other restrictions.

The goal of Chapter 40B is to encourage the production of affordable housing in all cities and towns throughout the Commonwealth. Many communities have used Chapter 40B to successfully negotiate the approval of quality affordable housing developments. The program is controversial, however, because the developer (nonprofit organizations or limited-dividend companies) has a right of appeal if the local zoning board rejects the project or imposes conditions that are uneconomic.

Because Chapter 40B establishes requirements that can contradict local interests, 40B has consistently met with local resistance. Local officials have claimed that the comprehensive permit granted under 40B limits their ability to conduct effective planning consistent with sustainable development principles. Another issue is that 40B forces municipalities to accept developments out of scale with established community character, and 40B has no provisions to address growing local concerns about the additional service costs of new housing developments.

3.7.5.4 Chapter 40R

Chapter 40R provides financial incentives to communities that establish a state approved smart growth zoning district (SGZD). Within the zone, towns are required to allow for denser residential development. In addition, at least 20 percent of the housing developed within a SGZD must be affordable to households making 80 percent of area median income. Upon state approval of a SGZD, a municipality receives a one-time incentive payment ranging from $10,000 to $600,000, depending on the number of total new housing units planned. An additional “density bonus payment” of $3,000 per housing unit is disbursed when a building permit is issued.

Mixed use and affordable housing is required in a SGZD, relieving the developer of the need to secure multiple local permits or get approval for the development at a public meeting. Communities worry that additional housing created under 40R will result in greater educational costs than what could be recovered through the property and excise taxes paid by those new households. As discussed in previous sections, Lunenburg has already established one SGZD.

3.7.5.5 Chapter 40S

Chapter 40S, addresses the potential impact on education costs, and creates a Smart Growth School Cost Reimbursement Fund to provide full reimbursement for any net new education costs resulting from housing units built under 40R. The Commonwealth Housing Task Force estimates that, if for example 33,000 new units were built, by the tenth year the density bonuses provided by the state would be $14 million annually and the school cost supplement would be $35 million annually. Much of this cost is covered by a Smart Growth Housing Trust Fund.

3.7.6 Water Balance

A water balance is an accounting of the withdrawals and discharges of water to a watershed, also referred to as an inflow/outflow analysis. The water balance can be determined by calculating the input, output, and storage changes within surface water such as reservoirs and subsurface resources such as groundwater. Typically, the major input of water is from precipitation and the major output is evapotranspiration. Additional inputs into the watershed can result from streamflow, infiltration from septic systems and wastewater treatment facilities; and, outputs can result from water supply withdrawals, streamflows, and wastewater discharges to facilities in other watersheds or subbasins.

The amount of stress that a subbasin may be under is determined by looking at the inflow and outflow of a watershed. The Lunenburg CWMP water balance is focused on the three (3) major subbasins in Lunenburg: Catacunemaug, Falulah-Baker and Mulpus. There are three (3) defined hydrologic stress classifications issued by the MA Department of Environmental Management (DEM, currently known as the Department of Conservation and Recreation) guidelines, as described in the draft memorandum: *Stressed Basins in Massachusetts*[3]. The three (3) classifications are:

- High-Stress: net average August outflow equals or exceeds estimated average natural (Virgin) August flow
- Medium-Stress: net 7Q10[4] outflow equals or exceeds estimated natural 7Q10 flow. 7Q10 is the lowest consecutive 7 day stream flow that is likely to occur in a ten year period in a particular river segment.
- Low-stress: no net loss to the subbasin.

The Lunenburg CWMP water balance updates the Nashua River Watershed model (NRW model), which was used for the *Hydrologic Assessment, Nashua River Watershed*, dated March 2002 and prepared for the DEM-Office of Water Resources. The NRW model is setup for users to input additional flow increases and decreases using year 2000 as the baseline. Specifically, this CWMP water balance update is prepared for the Town of Lunenburg for the planning period of 2006 through 2026. The water balance update includes an analysis of the watershed portion within the Town borders.

The NRW model is set up to allow input of additional information that has been collected for a town since the year 2000, to aid in identifying current and projected conditions on the subbasins. The data input for the model includes:

- municipal water withdrawals and distribution,
- municipal wastewater collection,
- sewer discharges to specific municipal wastewater treatment facilities, and
- interbasin transfers of municipal water.

The model assumes that the water withdrawal from individual private wells is returned through on-site septic systems to the same subbasin as the source.

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[3] Office of Water Resources, February 26, 2001.
[4] Glossary.

3.7.6.1 Water Withdrawals

The total amount of water withdrawn from each sub basin is the sum of the withdrawals from the municipal water supply sources and all non-municipal water withdrawals by commercial/industrial entities that are required to report such data to the DEP.

The 2006 average daily demand (ADD) for drinking water withdrawals was 0.46 million gallons per day (mgd), based on records provided by the Lunenburg Water District. The 2006 withdrawals occurred from within the Catacunemaug subbasin from the Lancaster Avenue wells No. 1, No. 2, No.4 and No. 5.

The 2026 water demands are based on population growth estimates and the Commonwealth of Massachusetts Water Resources Commission Disaggregated Water Needs Forecast – Method 1 (a.ka. DEM Method 1 Water Needs Forecast). This CWMP planning period is from 2006 to 2026, and the estimated population for year 2026 is 13,770. Using this population estimate and the DEM Method 1 Water Needs Forecast, the 2026 estimated average daily demand (ADD) is 0.61 mgd. Since there are no plans to expand the District at this time, it is assumed that the District will continue to withdraw water from the same source as 2006 – the Lancaster Avenue wells in the Catacunemaug subbasin.

It should be noted that this 0.61 mgd ADD in 2026 is based on the Stantec growth projections, which take the currently planned developments in Lunenburg into account, and no other development which may occur in the planning period. As such, the increase in municipal withdrawals is only projected to be 0.15 mgd. Wright-Pierce's growth projections from earlier in this chapter show an increase of 0.21 mgd in water consumption in the existing sewered areas alone. Because the Water Management Act currently restricts the district from withdrawing more than 0.61 mgd, the Water District, under current permits and with existing wells, would not be able to provide the water necessary to support the growth projected by Wright-Pierce earlier in this chapter. If the Water District does not receive additional pumping capacity, the restrictions of the WMA could be a limiting factor for growth in Lunenburg. For water balance purposes, we have assumed that the projected growth will not be hindered by the withdrawal capacity of the LWD - in other words, these new developments would still be feasible, and their water needs could be served by on-site supplies (i.e. well water). We feel that this approach is appropriately conservative for a planning study, as it would show the maximum impacts of continued growth on the water balance, with additional outflow from the sub-basins due to continued growth in the existing sewered areas.

In summary, the following municipal water withdrawals for each sub basin are:

TABLE 3-7
SUMMARY OF MUNICIPAL WITHDRAWALS (mgd)

Year	Catacunemaug
2006 (ADD)	0.46
2026 (ADD)	0.61

mgd = million gallons per day

The non-municipal withdrawals are listed in Table 3-8. The DEP Annual Water Supply Statistical Reports were reviewed for the years 2002-2006 and an average withdrawal was assumed for 2006. The maximum withdrawal assigned by DEP for each non-municipal withdrawal was utilized for Year 2026 with the exception of the Maplewood Golf Course. This surface water withdrawal is permitted for a yearly withdrawal of 88.95 million gallons. This permitted withdrawal appears to be excessive given the withdrawal history of the golf course and the average withdrawal assumed for 2006 was assumed for 2026. The non-municipal withdrawals were assumed to be completely consumed and not included in the water distribution calculations.

TABLE 3-8
SUMMARY OF NON-MUNICIPAL WITHDRAWALS

	Average (MG)	Average (MGD)	Maximum (MG)	Maximum (MGD)	Subbasin
Private Groundwater Supplies					
Meadowwoods MHP	1.477	0.00405	7.665	0.02100	Mulpus
Fairlane MHP	0.856	0.00235	0.365	0.00100	Mulpus
Shady Point Campground	0.009	0.00002	1.150	0.00315	Catacunamaug
Cherry Hill Ice Cream	0.064	0.00018	1.971	0.00540	Catacunamaug
Watervend @ Hannaford Food*	0.025	0.00007	-	-	Falulah/Baker
Surface Water Withdrawals					
Maplewood Golf Course	0.716	0.00196	88.950	0.24400	Falulah/Baker

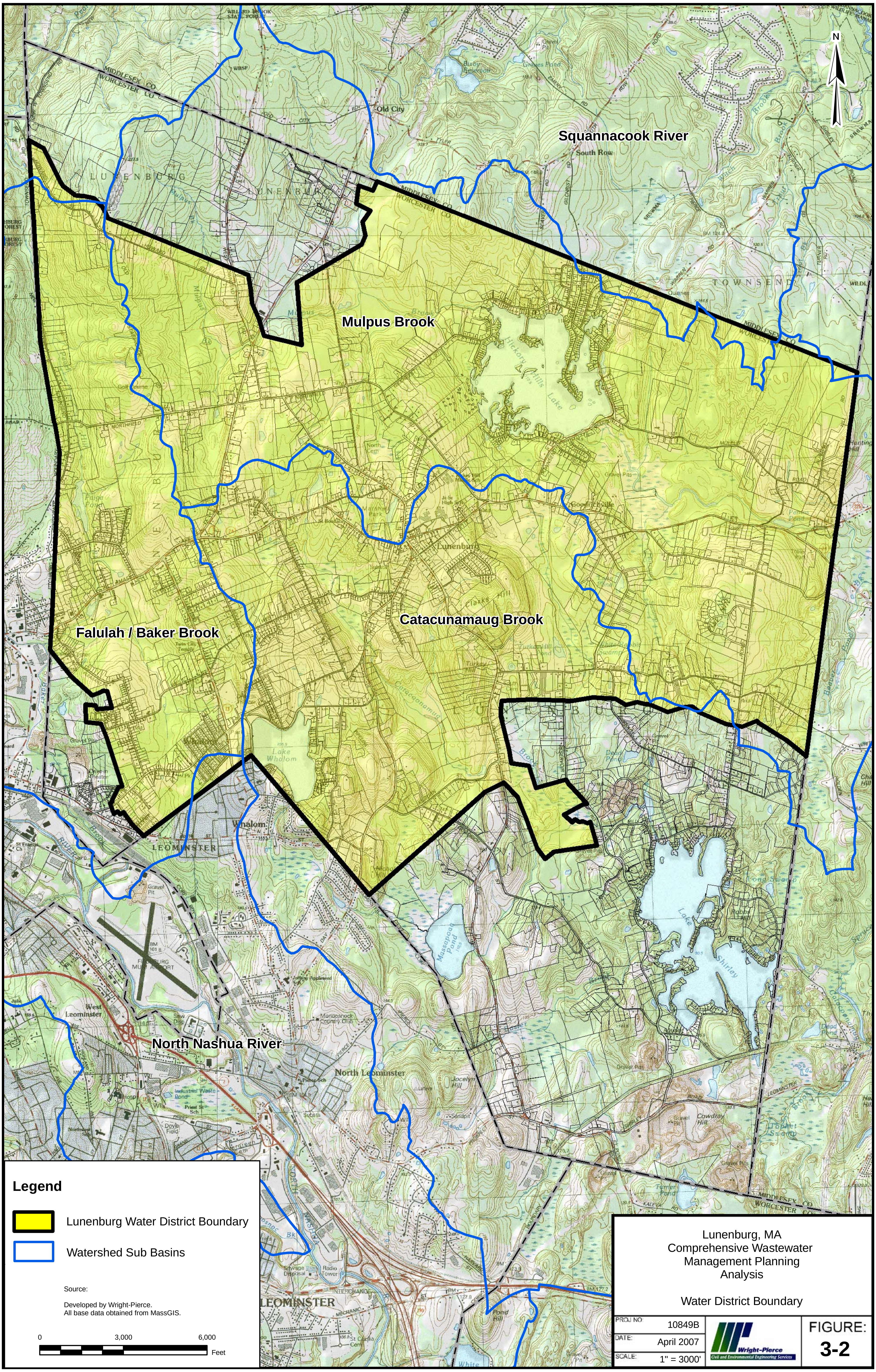
* According to the MA DEP, the Watervend private groundwater supply purchases its water from the Lunenburg Water District and has no maximum withdrawal assigned to it. Therefore, this withdrawal is not carried through the water balance and is assumed to be included in the municipal withdrawals.

3.7.6.2 Water Distribution

Water distribution is calculated by applying the percent of parcels within the Water District in each subbasin to the amount of drinking water distributed. Refer to Figure 3-2 for the Water District Boundary. The water distribution is based on the October 2006 Assessor's database of populated parcels in each subbasin. There are no specific plans for redefining the LWD boundaries; therefore, it is assumed that future distribution will match the 2006 distribution estimate. In summary, utilizing the percent distribution, the distributions are as follows:

TABLE 3-9
MUNICIPAL WATER DISTRIBUTION (mgd)

Year	Catacunemaug	Falulah-Baker	Mulpus Brook
2006	0.196	0.154	0.102
2026	0.260	0.204	0.135



Squannacook River
Mulpus Brook
Catacunamaug Brook
Falulah / Baker Brook
North Nashua River
Legend
Lunenburg Water District Boundary
Watershed Sub Basins
Source:
Developed by Wright-Pierce.
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Water District Boundary
PROJ NO: 10849B
DATE: April 2007
SCALE: 1" = 3000'
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
3-2

3.7.6.3 Municipal Wastewater Collection

The amount of water collected is calculated by using the estimated quantity of wastewater delivered to the municipal sewer system. The municipal wastewater collected from each Lunenburg sub basin for year 2006 and the projected wastewater for year 2026 is listed in Table 3-10.

TABLE 3-10
YEAR 2006 AND PROJECTED 2026 WASTEWATER COLLECTION (mgd)

Year 2006	**Sanitary/Municipal**	**I/I***	**Total**
Catacunamaug	0.0268	0.0645	0.091
Falulah/Baker	0.0604	0.0378	0.097
Mulpus	0.0053	0.001	0.006
Year 2026	**Sanitary/Municipal**	**I/I***	
Catacunamaug	0.160	0.065	0.225
Falulah/Baker	0.199	0.038	0.237
Mulpus	0.025	0.001	0.026

*I/I is based on the length of sewer main.

Municipal Wastewater Discharges

Municipal wastewater is discharged to the Fitchburg and the Leominster wastewater treatment facilities (WWTFs), which are located in the North Nashua River 1 subbasin. Two private WWTFs discharge approximately 0.0096 mgd into the Mulpus subbasin. All of the distributed discharge of the wastewater to the municipal treatment facilities for the Catacunamaug and Mulpus sub basin including sanitary and I/I flows go to Leominster.

The distributed discharges in the Falulah subbasin flow to both the Fitchburg and the Leominster WWTFs in the quantities listed below:

Year 2006: 0.038 mgd sanitary and 0.013 mgd I/I flows to Fitchburg WWTF; and
0.022 mgd sanitary and 0.024 mgd I/I flows to Leominster WWTF.

Year 2026: 0.0793 mgd sanitary and 0.0134 mgd I/I flows to Fitchburg WWTF; and 0.1192 mgd sanitary and 0.0244 mgd I/I flows to Leominster WWTF.

The total municipal discharges to each sub basin are distributed as detailed in Table 3-11.

TABLE 3-11
MUNICIPAL SEWER DISCHARGES (mgd)

Year	Catacunemaug	Falulah-Baker	Mulpus
2006			
Fitchburg		0.051	
Leominster	0.091	0.046	0.006
2026			
Fitchburg		0.093	
Leominster	0.225	0.144	0.026

3.7.6.4 Interbasin Transfers of Municipal Water

In the NRW model, there was an interbasin transfer of municipal water from Leominster to Lunenburg for year 2000. Based on conversations with the LWD, there are no current interbasin transfers of municipal water; therefore, the model has been changed to reflect this for year 2006. Also, it is anticipated that the LWD will continue to be able to supply municipal water for future developments as discussed in the Stantec report and the model reflects this.

3.7.6.5 Lunenburg Water District - Water Balance

The Lunenburg Water District Water Supply Assessment Report included a water balance analysis for only the "water district" areas within the Catacunamaug and Mulpus subbasins. The LWD water balance incorporated the future potential export of sewer flow for the proposed Phase 2 and Phase 3 sewer expansions relating to buildout conditions. The CWMP water balance is based on the wastewater flows estimated in the Phase I CWMP report.

3.8 Water Balance Summary

A summary of the water balance calculations is detailed in Table 3-12 and 3-13.

TABLE 3-12
SUMMARY OF TOWN OF LUNENBURG WATER BALANCE INPUTS (mgd)

	Catacunamaug Subbasin		Falulah-Baker Subbasin		Mulpus Subbasin	
	2006	2026	2006	2026	2006	2026
Water Withdrawal (mgd)	(0.46)	(0.61)	(0.006)	(0.026)	(0.002)	(0.002)
Water Distributed[5]	0.196	0.260	0.154	0.204	0.102	0.135
Sewer Discharges[6]	(0.091)	(0.225)	(0.097)	(0.237)	(0.006)	(0.026)
Water Balance for Lunenburg Only	(0.355)	(0.575)	0.051	(0.059)	0.094	0.107

TABLE 3-13
NET IMPACTS ON SUBBASINS (mgd)

	Catacunamaug Brook		Falulah Brook		Mulpus Brook	
	2006	2026	2006	2026	2006	2026
Water Balance for Lunenburg Only	(0.355)	(0.575)	0.051	(0.059)	0.094	0.107
Water Balance for Other Municipalities	0.259	0.231	(0.628)	(0.594)	(0.389)	(0.405)
Inflow/Outflow Total Balance (Subbasin-wide)	(0.096)	(0.344)	(0.577)	(0.653)	(0.295)	(0.298)
7Q10 (Natural)	0.218	0.218	0.877	0.877	0.173	0.173

The Luneburg water balance calculations were then applied to the sub basins. The sub basin calculations include the entire watershed sub basin which includes portions outside of Luneburg's town boundaries. The water balance model results presented above assumes that there are no water balance changes outside of the Lunenburg town boundaries from what was used in the NRW model to show the impact of Lunenburg's water balance on the sub basins. The impacts of growth in Lunenburg over the next 20 years, and the impacts from other municipalities which share the sub-basins, are shown in Table 3-13.

[5] Water Distribution – Catacunemaug = 42.7%, Falulah-Baker = 33.4%, and Mulpus = 22.2%
[6] Catacunemaug and Mulpus Sewer Withdrawals to Leominster Only

The results of the water balance indicate, as detailed in Table 3-14, that year 2006 hydrologic stress on the subbasins was calculated to be

- Falulah Brook is estimated to flow under Low Stress conditions;
- Mulpus Brook is estimated to flow under Medium Stress conditions; and,
- Catacunemaug Brook is estimated to flow under Low Stress conditions.

TABLE 3-14
2006 ESTIMATED WATER BALANCE

	7Q10 Virgin Flow (mgd)	Existing (2006) Subbasin Inflow/(Outflow) (mgd)	7Q10 Existing (2006) Flow (mgd)	Average August Virgin Flow (mgd)	Existing (2006) Subbasin Inflow/(Outflow) (mgd)	August Existing (2006) Flow (mgd)	Calculated Stress Level
Falulah Brook	0.877	(0.577)	0.300	5.415	(0.577)	4.839	Low-Stress
Mulpus Brook	0.173	(0.295)	(0.122)	7.233	(0.295)	6.938	Medium-Stress
Catacunemaug Brook	0.218	(0.096)	0.122	9.103	(0.096)	9.007	Low-Stress

*The estimated water balance includes portions of the sub basin outside of the Lunenburg town boarders.

However, as detailed in Table 3-15, for the year 2026,

- Falulah Brook is estimated to continue to flow under Low Stress conditions;
- Mulpus Brook is estimated to continue to flow under Medium Stress conditions; and,
- Catacunemaug Brook is estimated to flow under Medium Stress conditions as opposed to current Low Stress conditions

TABLE 3-15
2026 ESTIMATED WATER BALANCE

	Annual 2026			August 2026			
	7Q10 Virgin Flow (mgd)	Subbasin Inflow/(Outflow) (mgd)	Calculated 7Q10 Flow (mgd)	Average August Virgin Flow (mgd)	Existing (2026) Subbasin Inflow/(Outflow) (mgd)	August Existing (2026) Flow (mgd)	Calculated Stress Level
Falulah Brook	0.877	(0.653)	0.224	5.415	(0.653)	4.763	Low-Stress
Mulpus Brook	0.173	(0.298)	(0.125)	7.233	(0.298)	6.935	Medium-Stress
Catacunemaug Brook	0.218	(0.344)	(0.127)	9.103	(0.344)	8.759	Medium-Stress

*The estimated water balance includes portions of the sub basin outside of the Lunenburg town boarders.

An initiative of this CWMP is to evaluate the potential positive effects of the disposal of highly treated wastewater effluent, as groundwater recharge, within the watershed subbasins in Lunenburg, in offsetting water withdrawals as water supply and/or the replacement of on-site wastewater disposal facilities with sewers. Potential discharge sites for the disposal of highly treated wastewater effluent will be given a priority within stressed watershed subbasins. Potential impacts to the water balance based on the alternatives analysis will be reviewed in the Phase II CWMP report.

SECTION 4

NEEDS ASSESSMENT

4.1 APPROACH

Many communities rely exclusively on private on-site wastewater treatment systems. The State Environmental Code, Title 5, provides a thorough regulatory framework for such systems. Under ideal circumstances, conventional Title 5 systems can provide cost effective and environmentally sound wastewater management. Those circumstances include favorable soils, adequate depth to groundwater, reliable and protected water supplies, and absence of sensitive down gradient receiving waters.

A town-wide needs assessment was conducted for the town of Lunenburg. The assessment was performed to review whether or not conventional on-site Title 5 septic systems can provide adequate means of providing for sanitation, environmental protection and growth management within a given study area today and through a 20 year planning period. For the purposes of this report, wastewater management needs have been evaluated in the following 5 categories:

- **Public Health**--correction or avoidance of unsanitary conditions such as effluent surfacing over a leaching field, inadequate set-back from a private well, or direct discharge of sanitary wastewater to a watercourse.

- **Water Supply Protection**--preventing contaminants (such as bacteria, viruses or nutrients) from reaching private or public drinking water sources.

- **Protection of Surface Waters**--such as reducing nutrients that can cause accelerated degradation of freshwater ponds (typically phosphorus).

- **Preserving Community Character**--highlighting areas of sensitivity particularly in regards to potential impacts of wastewater alternatives. Sensitive areas that were included in the assessment were ACECs, Priority/Estimated Habitat Areas, Open Space/Protected Lands, and the Historic District.

- **Managed Growth**-- providing wastewater treatment and disposal so that conventional Title 5 system conditions (such as impermeable soils or shallow groundwater) are not the limiting factors to managed growth and development. The Town is working on planning and regulations for managed growth.

The overall approach for the needs assessment was to categorize wastewater treatment needs according to these five general categories. The specific approach is different for each category, and is presented in the following sections. Each category has been evaluated separately, and then the results compiled town-wide to address the fact that some lots fall into more than one category of need.

4.2 NEEDS RATING METHODOLOGY

The needs assessment rating methodology focused on avoiding sanitary problems, protecting the Town's drinking water supply, reducing nutrients to surface waters, maintaining community character, and managing impacts from growth. The needs assessment utilized the study areas developed in Section 3 of the Phase I CWMP. Each of these study areas was evaluated utilizing a two-tiered approach. The 24 study areas are detailed in Table 4-1.

A ranking formula was created to establish or eliminate areas for further evaluation of the need for offsite or alternative wastewater treatment disposal. Then, each potential "needs" area was evaluated based on BOH files from selected systems from each area, a visual analysis of specific areas within town, and the potential for further development. A “needs area” is defined as a study area which will be further reviewed in Phase II. A needs areas may not be well suited to utilize a conventional Title 5 septic system to provide adequate means of providing for sanitation, environmental protection and growth management within a given study area today and through the 20 year planning period. In Phase II, specific recommendations by area will take into account the appropriateness of utilizing septage management plans, stormwater management plans, nutrient management plans, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal.

The evaluations were compared to determine: (1) if a given area showed consistent need; (2) areas where there was a conflict in need (e.g. areas that did not show a need in the first tier, but are historically known to be problem areas); and (3) areas of no need, where existing on-site wastewater systems are adequate means of disposal.

TABLE 4-1
STUDY AREAS

Study Area	Area (Acres)	Watershed Sub-Basin
1	157	Squannacook
2	550	Fallulah/Baker
3	384	Fallulah/Baker
4	154	Fallulah/Baker
5	18	Fallulah/Baker
6	277	Fallulah/Baker
7	163	Fallulah/Baker
8	102	Fallulah/Baker
9	361	Catacunamaug
10	235	Catacunamaug
11	2,416	Mulpus
12	242	Mulpus
13	187	Mulpus
14	774	Mulpus
15	134	Catacunamaug
16	1,655	Catacunamaug
17	753	Catacunamaug
18	692	Catacunamaug
19	1,295	Catacunamaug
20	1,076	Catacunamaug
21	497	Mulpus
22	626	Mulpus
23	567	Mulpus
24	73	Squannacook

4.2.1 Tier 1

The Tier 1 analysis was a GIS mapping and data based approach. This approach was derived from the data we received from numerous different stakeholders. Data for the Tier 1 analysis was obtained from Lunenburg Board of Health records, Lunenburg Assessors data, Lunenburg Conservation Commission composite figures, the Natural Resources Conservation Service (NRCS), and the Massachusetts Geographical Information System[1] (MassGIS). Each specific type of data was formed into a GIS "layer" of information. All of the layers were ranked from 0 to 5 based on their capability to provide adequate on-site treatment. The rankings were then assigned a color scheme which related to the ranking scores from green to red. A rating of "0", or, green is associated with well suited conventional on-site wastewater disposal conditions and "5", or red, is not well suited for on-site wastewater disposal conditions.

The following sections describe each individually ranked layer and the associated ranking scores. The entire ranking matrix is included in Appendix K, and figures depicting each ranked layer are included in Appendix L.

4.2.2 Public Health

Correction or avoidance of public health problems was addressed by considering:

- Properties that failed Title 5 inspections or required variances from Title 5 to install or repair an on-site system;
- Area drainage qualities;
- Area depth to bedrock; and
- Lot size.

Title 5 Inspections

The Lunenburg BOH requires inspections that are in accordance with Title 5 and additional BOH regulations. The typical components of a Title 5 system are a septic tank, distribution box, on-

[1] Glossary

site wastewater disposal system, and reserve area. Title 5 requires a reserve area to be located on the property such that it can be used in case the primary on-site wastewater disposal system fails. Setback requirements are also specified in the Title 5 code, which identifies the minimum horizontal separation required between the on-site wastewater disposal system and items such as a drinking water well, property lines and wetlands.

Properties are inspected by for compliance with Title 5 during the process of a real estate transaction or due to public health concerns. If a property does not comply with the regulations, then it is considered a failed system. It is important to distinguish between failures and variances, and those of environmental significance when evaluating the need to provide off-site wastewater disposal. Failures due to public health concerns, such as, breakout, multiple pump-outs, insufficient depth to groundwater/water table, and close proximity (within 50 feet) to a private well were ranked as more of a concern. The BOH provided input and review in developing the methodology.

Variances from the Title 5 code may be granted for septic systems that have natural site conditions which prevent on-site system design from meeting standard requirements. If significant variances from Title 5 are required to allow an on-site system to be constructed or repaired, then there may be benefits to providing that property with an off-site wastewater solution. In some cases, natural site conditions can be enhanced with a mounded system or an individual I/A system. Many regulators and home owners prefer not to utilize I/A systems or above-grade wastewater treatment systems (mounded systems). These systems may require regular sampling and monitoring and are usually more expensive on a per-user basis. Mounded systems, particularly those associated with severe retaining walls and lack of landscaping, are often viewed as aesthetically displeasing by neighbors or passers-by.

The study areas in Lunenburg were evaluated using the BOH's database for Title 5 inspections. The Title 5 inspection data layer was evaluated based on Title 5 failures and variances issued in each study area. The ranking formula for this layer is presented in Table 4-2. Any place that had multiple failures or variances was added up and the sum used as the rating. Failures within the Town's drinking water buffer zone for each water supply (Zone I's) are not included in this part of the analysis and are assessed in the data layers for water supply protection. In Tier 2, BOH files for selected properties were further reviewed for specific details will be discussed further in subsequent sections of this report.

TABLE 4-2
TITLE 5 INSPECTION RANKING FORMULA*

Pass	
Further Evaluation	0
Conditional Pass	0
Variance (ranked by type)	
Reduced Offset to Septic System	5
Reduction of Soil Depth	4
Reduced Groundwater Offset	3
Sieve Analysis	2
Reduced Offset Septic to Wetland	2
Well Variance	0
Local Variance	0
Title 5	0
Failures	
Back up	4
Breakout	5
Clogged	4
Pumped > 4 x per yr	5
Below Groundwater	5
Within 100 feet of surface water supply	0
Within Zone I	0**
Within 50 feet of private well	5
Within 50-100 feet of private well	4

* 0 - Well suited, 5 - Not well suited
** included in water supply protection rating

Soil Type/ Soil Drainage Class

The town was evaluated based on areas of poor soil drainage qualities. Soil classifications were determined based on NRCS[2] data. There are 69 soil types in Town and each were classified

[2] Acronym

using NRCS drainage categories. Soil types and their associated drainage class are described in Section 2 and each term is defined in Appendix M.

It should be noted that the NRCS data also considers soils classified as excessively drained as a severe soil type. These gravelly soils are often noted to have ‘fast percs’ of less than 2 minutes per inch (mpi). Title 5 does allow septic systems to be constructed under these conditions with a 5-foot offset to groundwater (a 4-foot offset is required for perc ratings above 2 mpi). These soils were ranked with priority so that study areas, when layered with depth-to-groundwater and proximity to surface waters, would be identified for further study. The soil drainage class ranking formula is included in Table 4-3.

TABLE 4-3
SOIL DRAINAGE CLASS RANKING FORMULA*

Soils/Drainage Class	
Well Drained	0
Moderately Well Drained	1
Somewhat Excessively Drained	2
Excessively Drained	4
Very Poorly Drained	5
Pits, Gravel, Quarry, Excavated Materials	2
Poorly Drained	3
Urban Land - Construction Land, Impervious Surfaces	4

Note : * 0 - Well suited, 5 - Not well suited

Depth to Bedrock

The town was evaluated based on having a limited depth to bedrock by study area. The depth to bedrock classifications were determined based on NRCS data. Depth to bedrock less than 6.5 feet begins to impact septic system design. While it is possible to install septic systems in areas with shallow bedrock, these septic systems are generally more costly to design and build. The depth to bedrock ranking formula is shown in Table 4-4.

TABLE 4-4
DEPTH TO BEDROCK RANKING FORMULA*

Depth to Bedrock		
Metric Units	English Units	
Less than 100 cm	Less than 3.2 feet	5
Greater than or equal to 100 cm and less than 200 cm	Greater than or equal to 3.2 feet and less than 6.5 feet	3
Greater than or equal to 200 cm	Greater than or equal to 6.5 feet	0

Note: * 0 - Well suited, 5 - Not well suited

Lot Size

Lot size has a direct affect on whether or not a failed on-site wastewater disposal system can be repaired to meet current Title 5 criteria. It is a reasonable assumption that under less than ideal soil and groundwater conditions, small lots in an area would, as a minimum, require a variance to Title 5 in order to repair the on-site wastewater disposal system. The lot size ranking formula is shown in Table 4-5.

TABLE 4-5
LOT SIZE RANKING FORMULA*

Lot Sizes	
<= 0.5 acre	5
0.5 < lot <= 1 acre	2
> 1 acre	0

Note: * 0 - Well suited, 5 - Not well suited

4.2.3 Water Supply Protection

Protecting Lunenburg's drinking water supply sources were assessed by reviewing:

- Depth to water table, and
- Areas within the Lunenburg's Water Resource Protection District (WRPD).

Depth to Water Table

The depth to water table was determined based on NRCS data. The annual minimum depth to the water table was utilized. The Title 5 regulations dictate certain requirements for the on-site wastewater disposal system. For instance, the minimum vertical separation distance from the bottom of the on-site wastewater disposal system to the top of the seasonally high groundwater table is 4 feet in soils where the percolation rate is greater than 2 minutes per inch (mpi) and 5 feet in soils where the percolation rate is less than or equal to 2 mpi. The BOH instituted a general policy for the approval of variance grants regarding vertical separation from groundwater. Due to the relatively high seasonal groundwater table in Town, variances for separation distances of 3 feet and 4 feet were granted as compared to the 4 and 5 foot separation required by Title 5, as long as no other variances were requested for the on-site wastewater disposal system. The depth to water table ranking formula is included in Table 4-6.

TABLE 4-6:
DEPTH TO WATER TABLE RANKING FORMULA*

Depth to Water Table (Annual Minimum)	
0-4 feet	4
4-7 feet	2
Greater than 7 feet	0

Note: * 0 - Well suited, 5 - Not well suited

This analysis also ranked areas within the WRPD as a priority so areas within drinking water protection areas would be identified for further study. The WRPD includes Zone I, Zone II, Zone III and Interim Wellhead Protection Area (IWPA)[3] zones of contribution. These areas are shown in Table 4-7.

[3] Source - MA DEP, 310 CMR 22.00 Drinking Water. Term in glossary.

TABLE 4-7:
WATER RESOURCES PROTECTION DISTRICT RANKING FORMULA*

Lunenburg Water Resource Protection District	
Within WRPD	3
Not Within WRPD	0

Note: * 0 - Well suited, 5 - Not well suited

4.2.4 Protection of Surface Waters

Lunenburg's freshwater ponds are all impacted, to varying extents, by development in their watersheds. The contaminants of principal concern are bacteria, phosphorus and nitrogen. Principal nutrient sources include on-site wastewater disposal, lawn fertilization, stormwater runoff, atmospheric deposition and the recycling from bottom sediments. In Phases II and III of the CWMP, nutrient control strategies will be identified and reviewed as possible alternatives, including wastewater collection/treatment/disposal, management of fertilizer application and stormwater management.

The protection of surface waters was addressed by considering:

- Areas with regulated setbacks, and
- Floodplains.

Areas with Regulated Setbacks

Surface water impacts were assessed utilizing state and town regulated set back requirements. The state requires that the buffer area is 50 feet around all hydrologic features and wetlands, except within the drainage basin for a public surface water supply, where the buffer zones are 100 feet around wetland features, 200 feet around streams and ponds, and 400 feet around public surface water supplies. The Lunenburg BOH requires a buffer area of 100 feet to any water course. The state regulated setback locations were mapped using data from MassGIS and the town setbacks were mapped based on 100 feet from the water courses in MassGIS. Table 4-8 includes the ranking formula for State and Town regulated setbacks for water courses.

TABLE 4-8
AREAS WITH REGULATED SETBACKS RANKING FORMULA*

Areas with Regulated Setbacks		
State	Within Title 5 Regulated Setback	5
Town	Within BOH Regulated Setback	4
	Not within setback	0

Note: * 0 - Well suited, 5 - Not well suited

Floodplains

Areas within the 100 and 500 year floodplains were assessed utilizing MassGIS data. The floodplains ranking formula is included in Table 4-9.

TABLE 4-9
FLOODPLAIN RANKING FORMULA*

Floodplains	
Within 100 yr Floodplain	4
Within 500 yr Floodplain	2
Not within floodplain	0

Note: * 0 - Well suited, 5 - Not well suited

4.2.5 Preserving Community Character

Preserving community character concerns in Lunenburg were assessed by reviewing sensitive areas. Sensitive areas that were included in the analysis were ACECs, Priority/Estimated Habitat Areas, Open Space/Protected Lands, and the Historic District. On-site wastewater disposal can be inconvenient and/or aesthetically displeasing to property owners or neighbors under certain circumstances. The goal of this "layer" was to review these sensitive areas. The ranking formula for preserving community character is included in Table 4-10.

TABLE 4-10
PRESERVING COMMUNITY CHARACTER RANKING FORMULA*

ACEC	
Within ACEC	3
Not within ACEC	0
Priority/Estimated Habitat Areas	
Within Habitat	3
Not within Habitat	0
Historic District	
Within District	3
Not within District	0

Note: * 0 - Well suited, 5 - Not well suited

4.2.6 Managed Growth

Some communities provide public wastewater collection systems in selected areas to promote more intense economic development than can be supported by on-site wastewater disposal systems. Typical examples include downtown commercial areas and industrial or office parks. The ranking formula for Managed Growth is included in Table 4-11. It shows that areas zoned for Commercial, Limited Business/Residential, Office Park and Industrial, and Retail/Commercial ranked with priority so areas with potential for offsite treatment would be identified for further study.

TABLE 4-11
MANAGED GROWTH RANKING FORMULA*

Zoning	
Commercial	2
Limited Business/Residential	2
Office Park and Industrial	2
Outlying	0
Recreation	0
Residence A	0
Residence B	0
Retail/Commercial	2

Note: * 0 - Well suited, 5 - Not well suited

4.2.7 Tier 1 Results

The ranked layers were compiled and the cumulative rating of all of the data rankings is shown in Figure 4-1. The cumulative rating ranges from 3 to 35, or green to red. A rating of "3", or green, is associated with areas most well-suited for on-site disposal systems and "35", or red, is associated with areas which appear not to be sufficient for adequately addressing wastewater treatment. The Tier 1 analysis shows several potential areas that should be reviewed for potential wastewater needs[4]. The CWMP process will define areas where a majority of the developed or developable areas located within the study area will not be able to utilize a conventional Title 5 septic system to provide adequate means of providing for sanitation, environmental protection and growth management within a given study area today and through the 20 year planning period.

Table 4-12 shows a break down of each study area and the data rankings calculated in Tier 1. The average need ranking was 10.84. Above average needs were identified for Areas 4, 5, 9, 10, 12, 14, 15, 19, 20, 22, 23, 24 (12 of the 24 total study areas). The total scores for the study areas with above average needs are shown in Table 4-13, and details of the scores are included in Appendix N. Above average Tier 1 needs was an element in the over all assessment and a factor going into Tier 2. Each study area, include above average needs areas, was reviewed again in Tier 2.

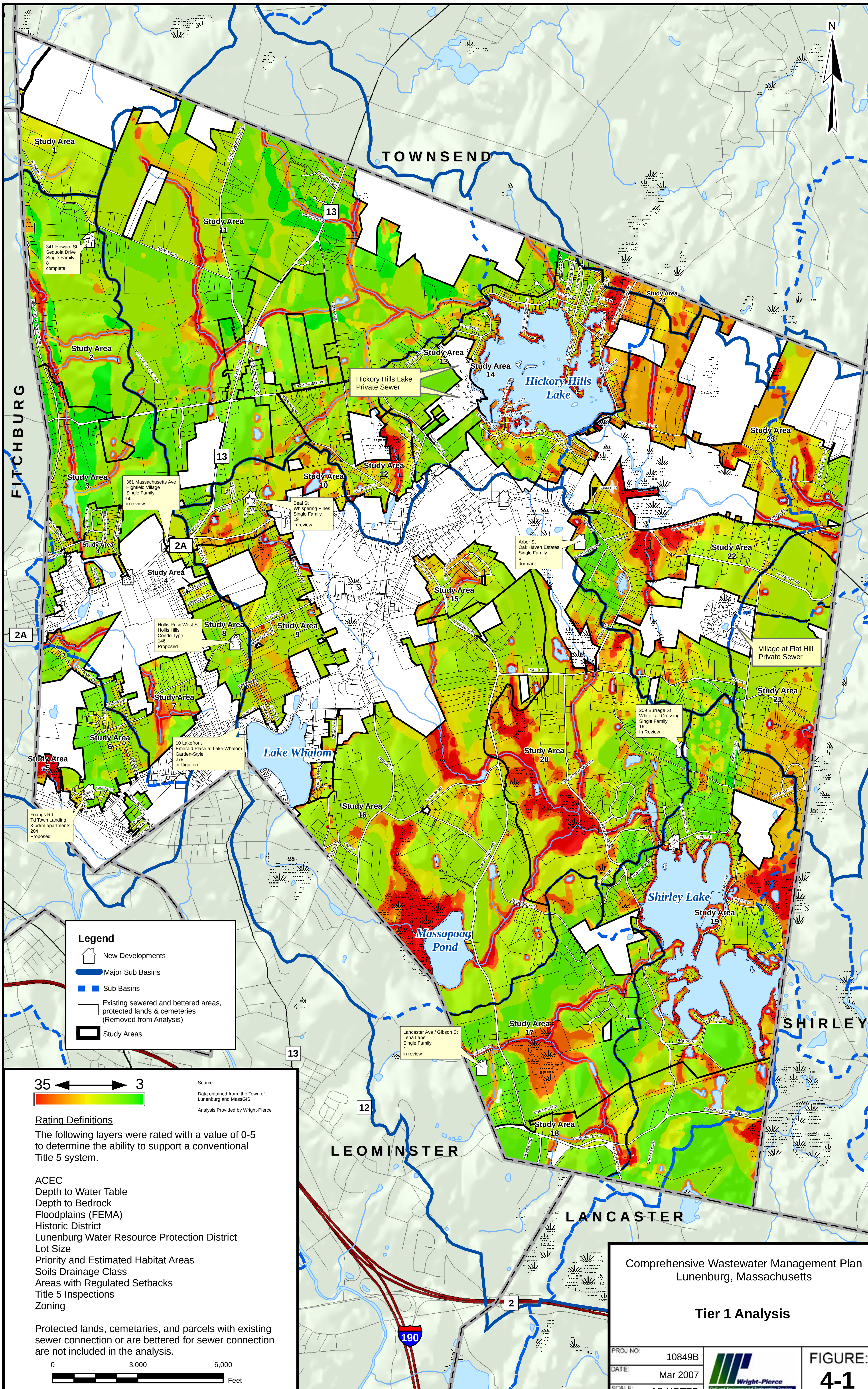

TOWNSEND
FITCHBURG
LEOMINSTER
LANCASTER
SHIRLEY
Hickory Hills Lake
Lake Whalom
Massapoag Pond
Shirley Lake
Study Area 1
Study Area 2
Study Area 3
Study Area 4
Study Area 5
Study Area 6
Study Area 7
Study Area 8
Study Area 9
Study Area 10
Study Area 11
Study Area 12
Study Area 13
Study Area 14
Study Area 15
Study Area 16
Study Area 17
Study Area 18
Study Area 19
Study Area 20
Study Area 21
Study Area 22
Study Area 23
Study Area 24
Hickory Hills Lake Private Sewer
Village at Flat Hill Private Sewer
341 Howard St Sequoia Drive Single Family 8 complete
361 Massachusetts Ave Highfield Village Single Family 66 in review
Beal St Whispering Pines Single Family 19 in review
Arbor St Oak Haven Estates Single Family 6 dormant
Hollis Rd & West St Hollis Hills Condo Type 146 Proposed
10 Lakefront Emerald Place at Lake Whalom Garden-Style 278 in litigation
Youngs Rd Td Town Landing 3-bdrm apartments 204 Proposed
209 Burrage St White Tail Crossing Single Family 16 In Review
Lancaster Ave / Gibson St Lena Lane Single Family 4 in review
Legend
New Developments
Major Sub Basins
Sub Basins
Existing sewered and bettered areas, protected lands & cemeteries (Removed from Analysis)
Study Areas
35 3
Source:
Data obtained from the Town of Lunenburg and MassGIS.
Analysis Provided by Wright-Pierce
Rating Definitions
The following layers were rated with a value of 0-5 to determine the ability to support a conventional Title 5 system.
ACEC
Depth to Water Table
Depth to Bedrock
Floodplains (FEMA)
Historic District
Lunenburg Water Resource Protection District
Lot Size
Priority and Estimated Habitat Areas
Soils Drainage Class
Areas with Regulated Setbacks
Title 5 Inspections
Zoning
Protected lands, cemetaries, and parcels with existing sewer connection or are bettered for sewer connection are not included in the analysis.
0 3,000 6,000
Feet
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts
Tier 1 Analysis
PROJ NO: 10849B
DATE: Mar 2007
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE: 4-1

TABLE 4-12
TIER 1 STUDY AREA RANKING RESULTS

Study Area	Onsite Suitability/Public Health					Water Supply Protection			Protection of Surface Waters			Preserving Community Character					Managed Growth		Total Score
	Title 5 Systems	Soils/ Drainage Class	Depth to Bedrock	Lot Sizes	Subtotal	Depth to Water Table (Annual Minimum)	Lunenburg Water Resource Protection District	Subtotal	Areas with Regulated Setbacks	Floodplains	Subtotal	ACEC	Priority/ Estimated Habitat Areas	Historic District	Open Space/ Protected Lands	Subtotal	Zoning	Subtotal	
1	0.00	1.30	0.86	0.08	**2.24**	3.34	0.00	**3.34**	0.28	0.00	**0.29**	2.86	0.00	0.00	0.00	**2.86**	0.00	**0.00**	**8.72**
2	0.11	0.83	2.59	0.08	**3.61**	2.59	0.00	**2.59**	0.68	0.20	**0.88**	0.09	0.00	0.00	0.00	**0.09**	0.00	**0.00**	**7.17**
3	0.10	1.05	0.89	0.05	**2.08**	2.78	0.00	**2.78**	0.70	0.25	**0.95**	0.00	0.00	0.00	0.00	**0.00**	0.10	**0.10**	**5.91**
4	5.99	0.99	1.84	1.25	**10.07**	3.05	0.00	**3.05**	0.34	0.06	**0.40**	0.00	0.00	0.00	0.00	**0.00**	0.16	**0.16**	**13.68**
5	0.00	4.56	0.00	0.03	**4.59**	3.64	0.00	**3.64**	4.57	3.92	**8.48**	0.00	0.00	0.00	0.00	**0.00**	2.00	**2.00**	**18.71**
6	3.65	1.68	0.24	0.88	**6.45**	3.35	0.00	**3.35**	0.45	0.14	**0.58**	0.00	0.00	0.00	0.00	**0.00**	0.38	**0.38**	**10.75**
7	0.23	1.67	2.19	0.41	**4.49**	3.02	0.00	**3.02**	1.21	0.19	**1.40**	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**	**8.91**
8	0.61	0.44	3.57	0.61	**5.22**	2.57	0.16	**2.73**	0.06	0.00	**0.06**	0.00	0.00	0.00	0.00	**0.00**	0.02	**0.02**	**8.03**
9	5.85	1.05	0.45	0.65	**7.99**	3.81	2.94	**6.75**	0.45	0.05	**0.50**	0.00	0.05	0.00	0.00	**0.05**	0.01	**0.01**	**15.29**
10	2.76	1.04	1.97	0.33	**6.09**	3.01	2.53	**5.54**	0.76	0.00	**0.76**	0.00	0.00	0.00	0.00	**0.00**	0.38	**0.38**	**12.77**
11	0.66	1.28	0.99	0.05	**2.98**	3.30	0.01	**3.31**	0.61	0.13	**0.75**	0.52	0.00	0.00	0.00	**0.52**	0.09	**0.09**	**7.64**
12	2.22	1.62	2.75	0.33	**6.92**	2.72	0.19	**2.91**	1.16	0.12	**1.28**	0.00	0.71	0.16	0.00	**0.87**	0.00	**0.00**	**11.98**
13	0.40	1.28	0.95	0.20	**2.83**	3.41	0.31	**3.71**	0.14	0.00	**0.14**	0.00	0.04	0.00	0.00	**0.04**	0.00	**0.00**	**6.72**
14	2.78	1.54	0.26	0.89	**5.47**	2.41	0.07	**2.49**	3.00	1.65	**4.64**	0.54	0.34	0.00	0.00	**0.88**	0.00	**0.00**	**13.47**
15	3.72	0.62	0.00	0.74	**5.08**	4.00	3.00	**7.00**	0.63	0.00	**0.63**	0.00	0.00	0.36	0.00	**0.36**	0.00	**0.00**	**13.07**
16	0.45	1.07	0.14	0.05	**1.69**	3.72	3.00	**6.72**	1.06	0.58	**1.63**	0.00	0.31	0.00	0.00	**0.31**	0.00	**0.00**	**10.35**
17	0.18	2.52	0.01	0.04	**2.75**	3.32	0.35	**3.67**	1.29	0.37	**1.65**	0.00	0.02	0.00	0.00	**0.02**	0.01	**0.01**	**8.10**
18	0.00	2.56	0.16	0.02	**2.73**	2.38	0.00	**2.38**	1.04	0.12	**1.16**	0.00	1.17	0.00	0.00	**1.17**	1.97	**1.97**	**9.41**
19	1.16	1.98	0.08	0.36	**3.57**	2.52	0.55	**3.07**	2.35	1.32	**3.67**	0.48	0.62	0.00	0.00	**1.10**	0.01	**0.01**	**11.42**
20	0.60	3.11	0.27	0.11	**4.10**	2.76	2.19	**4.94**	1.53	0.64	**2.17**	0.11	0.18	0.00	0.00	**0.29**	0.00	**0.00**	**11.50**
21	0.00	1.32	0.90	0.05	**2.27**	3.29	0.00	**3.29**	0.32	0.04	**0.36**	2.94	0.58	0.00	0.00	**3.52**	0.02	**0.02**	**9.45**
22	0.96	1.84	0.46	0.13	**3.39**	3.31	0.05	**3.36**	0.99	0.24	**1.23**	2.36	0.59	0.00	0.00	**2.95**	0.04	**0.04**	**10.98**
23	0.00	0.88	1.81	0.06	**2.76**	3.11	0.00	**3.11**	0.90	0.16	**1.06**	2.99	2.54	0.00	0.00	**5.53**	0.06	**0.06**	**12.52**
24	0.00	1.45	2.03	0.30	**3.79**	2.72	0.73	**3.45**	0.95	0.10	**1.05**	2.53	2.68	0.00	0.00	**5.21**	0.00	**0.00**	**13.50**
Appendix N Table	**1**	**2**	**3**	**4**		**5**	**6**		**7**	**8**		**9**	**10**	**11**			**12**		
																		Average	**10.84**
																		Above Average Needs	

TABLE 4-13
STUDY AREAS WITH TIER 1 ABOVE AVERAGE WASTEWATER NEEDS

Study Area	Score
4	13.68
5	18.71
9	15.29
10	12.77
12	11.98
14	13.47
15	13.07
19	11.42
20	11.50
22	10.98
23	12.52
24	13.50

4.2.8 Tier 2

The Tier 2 assessment was based on an observation approach. The analysis was based on BOH files from selected systems in each area, a visual analysis of specific areas within town, the potential for further development and growth management. The Tier 2 Analysis determined: (1) if a given area showed consistent need; (2) areas where there was a conflict in need (e.g. areas that did not show a need in the first tier, but are known to be problem areas); and (3) areas of no need, where existing on-site wastewater disposal systems are adequate. The criteria reviewed for Tier 2 is included in Table 4-14.

TABLE 4-14
TIER 2 CRITERIA

Public Health	
	Percolation Rate
	Depth to Groundwater at Inspection
Water Supply Protection	
	High Water Use
Protection of Surface Waters	
	Surface Water Quality
	Nutrients
Preserving Community Character	
	Visual Analysis
Managed Growth	
	Development of Adjacent Land
	Agricultural Lands
	Growth Management Districts

4.2.9 Public Health

Files from specific properties in Town were reviewed for percolation (perc) rates, and depth to groundwater at the time of inspection. The selected properties were chosen based on the verification of the potential need. Some records were reviewed to substantiate the results from the Tier 1 analysis and other records were chosen to contrast the results from the Tier 1 analysis.

Percolation Rate

On-site wastewater disposal system leachfields comprised of soils with low perc rates can conceivably leach wastewater to down gradient surface water with reduced treatment and soils with high perc rates can provide a cause for effluent breakout, resulting in a public health concern.

A standard perc test is performed to gauge an approximate measure of the soil's percolating capacity, or ability to pass water down through the soil. Perc testing regulations and procedures are specified in Title 5.

Current Title 5 regulations do not allow septic systems to be constructed in soils with perc rates higher than 60 mpi. These soils, which typically have high percentages of silt and/or clay, reduce the rate at which effluent can percolate through them. As a result, the septic system often will back up when septic tank effluent is applied at a rate faster than it passes through the soil, creating a public health risk. On the other hand, gravelly soils are often noted to have 'fast' perc rates of less than 2 mpi. Title 5 does allow septic systems to be constructed under these conditions with a 5-foot offset to groundwater.

Depth to Groundwater at Inspection

The Title 5 regulations dictate certain requirements for the on-site wastewater disposal system. For instance, the minimum vertical separation distance from the bottom of the on-site wastewater disposal system to the depth to groundwater at inspection is 4 feet in soils where the perc rate is greater than 2 mpi and 5 feet in soils where the perc rate is less than or equal to 2 mpi.

4.2.10 Water Supply Protection

Areas of high water use were noted during this analysis. Areas which have a greater need for water, such as industrial areas, will also have a higher wastewater flow. This is not true of all types of developments such as commercial use which typically has a lower water demand than residential use.

4.2.11 Protection of Surface Waters

Study areas that are located in close proximity to surface waters with water quality issues were noted during this analysis. The needs areas located within those locations will be reviewed for wastewater and nutrient management in order to maximize the treatment potential of the on-site wastewater disposal systems.

4.2.12 Visual Analysis

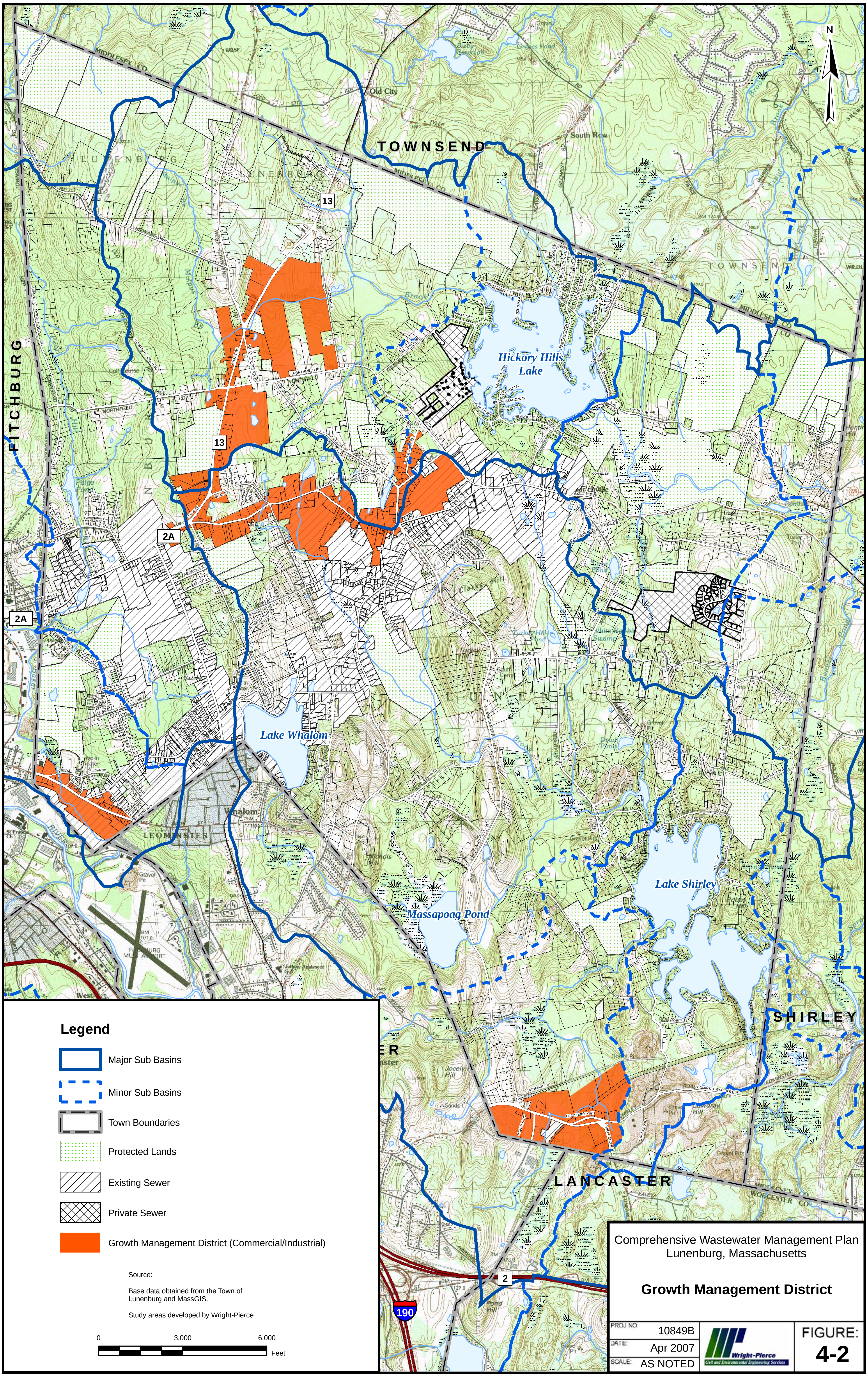
A visual analysis was conducted in Lunenburg by Wright-Pierce on Friday November 8, 2006. A brief visual survey was performed to determine overall characteristics of each Area. The survey included:

- identification of natural characteristics surrounding the Area, such as the presence of woodlands, water bodies, floodplain or wetlands;
- comments on the development characteristics of the neighborhood, such as density of development and presence or absence of trees or ledge outcroppings;
- description of the overall topography of the Area, including the severity and direction of street grades, and house elevation in relation to the street elevation;
- identification of signs of failed on-site systems; and
- identification, characterization, and listing of any commercial properties by street address. The survey locations were determined by the Tier 1 results and were "drive-by with appropriate stops" in order to verify and calibrate the Tier 1 analysis.

4.2.13 Potential Development and Managed Growth

Areas of undeveloped and agricultural lands were assessed for potential development and noted during the visual analysis. The Conservation Commission also provided information on areas which are protected, as state or town conservation land, partially protected land, as Chapter 61A and 61B land, and land which is unprotected.

In addition during Tier 2, the Planning Board reviewed areas of Town that the CWMP Phase II report should further study. On April 11, 2007, the Planning Board approved Growth Management Districts (GMDs) for commercial and industrial developments, as shown in Figure 4-2. The Planning Board took into account the Town goals and determined areas which maybe well suited for managed growth in terms of encouraging commercial and industrial development.



Legend

- Major Sub Basins
- Minor Sub Basins
- Town Boundaries
- Protected Lands
- Existing Sewer
- Private Sewer
- Growth Management District (Commercial/Industrial)

Source:

Base data obtained from the Town of Lunenburg and MassGIS.

Study areas developed by Wright-Pierce

0 3,000 6,000 Feet

Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts

Growth Management District

PROJ NO:	10849B	Wright-Pierce Civil and Environmental Engineering Services	FIGURE: 4-2
DATE:	Apr 2007		
SCALE:	AS NOTED		

These areas will be refined in Phases II and III as the Planning Board gains a better understanding of the parcels within these GMDs and the current zoning. The Planning Board will also consider possible zoning and other changes which may help to encourage commercial and industrial development. Wastewater management for these areas will be reviewed during Phase II for the current disposal methods and the impacts of utilizing wastewater management to encourage development.

4.2.14 Needs Assessment by Study Area

The following are descriptions of each study area and the results from the Tier 1 and Tier 2 analyses.

Study Area 1

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town’s Board of Health regulations. This study area, which is located on the northwest Lunenburg town line, is 157 acres and in the Squannacook sub-basin. Roadways in this area include Howard Street.

According to the Tier 1 analysis, there is a small portion of this area which shows potential need along a stream and in wetlands. Water resources are not considered an area of need. This area is zoned as Outlying, comprised of large lots, abuts a State forest, and is within an ACEC. Also, in this area are a tree farm and some larger, undeveloped and unprotected lands. The soils in this area are well drained and some areas have high groundwater. According to the BOH database, there have been no Title 5 failures in this area. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 2

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town’s Board of Health regulations. This study area, which is located on the western side of Lunenburg along the Fitchburg town line, is 550 acres and in the Falulah/Baker watershed sub-basin. Roadways in this study area include the northern end of West Townsend Road.

The majority of the soils in this area are well drained and there is adequate depth to groundwater. The area includes the Maplewood Golf Course and is comprised of Outlying and Recreation zoning districts. This area also includes several larger, undeveloped and unprotected parcels. According to the BOH database, there have been no Title 5 failures in this area. According to the Tier 1 analysis, there is a small portion of this area which shows potential need but this area is along a stream. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 3

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located in the western portion of Lunenburg, is 384 acres and in the Falulah/Baker watershed sub-basin.

The area is comprised of some larger, undeveloped and unprotected lands. According to the BOH database, there have been no Title 5 failures in this area. This area is zoned as Residence A and Commercial, has primarily well drained soils, and has some areas of high groundwater. According to the Tier 1 analysis, there are small portions of this area which show potential need but these areas are along streams. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 4 (Lower Mass Avenue)

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster or regional wastewater systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the western portion of town along the Fitchburg town line, is 154 acres and in the Falulah/Baker watershed sub-basin. Roadways in this study area include White Street, Charlton Street, Broadmeadow Drive, Maple Parkway, Eastern Avenue and Upland Avenue. This area has a small pond and several surrounding wetlands.

This study area was found to have moderately well drained soils and high groundwater levels. This area is zoned as Residence A. This area is generally comprised of smaller lots with older homes (circa 1950's - 1960's) with some mounded systems. Charlton Street has some ledge outcroppings and lots that slope steeply back to wetlands. This study area is adjacent to study area 3 which is comprised of some larger, undeveloped and unprotected lands.

This area showed above average needs in the Tier I analysis. There have been several Title 5 failures in this area, according to the BOH database. Some failures resulted in variances for groundwater offset, leachfield area, failed perc tests, bedrock offset, and lack of area due to small lots size. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at depths of 3 feet, although some areas reported groundwater at approximately 5 feet. Perc tests varied from 2 to 35 mpi.

Study Area 5

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in this study area. This study area, which is located in the southwest portion of town along the Fitchburg town line, is 18 acres and in the Falulah/Baker watershed sub-basin. This area is comprised of wetlands and generally marshy. The Tier 1 analysis showed this as a needs area. However, this area was determined not to be a needs area during the Tier 2 analysis, due to the fact that there are no residences and is unable to be developed.

Study Area 6 (Baker Station)

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster or regional wastewater systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the southwestern portion of town along the Fitchburg line, is 277 acres and in the Falulah/Baker watershed sub-basin. Roadways in this study area include Pratt Street, West Street, and Pleasant Street. The Tier 1 analysis shows some areas of potential need. This study area is comprised of some dense, built-out areas which show need but also of larger, undeveloped and unprotected lands. This area is zoned primarily as Residence A. This study area was found to have high groundwater level and moderately well drained soils with some portions of poorly drained soils. It was observed that portions of this area have smaller lots with older homes (circa 1950's - 1960's), steep slopes, forested yards, streams and wetlands. The western portion is adjacent to conservation land along the Fitchburg town line.

This area did not have above average needs in the Tier 1 analysis. The sections of need are the small lots along the existing roadways, but there are several large lots in this area, so the needs averaged out to be below average. Alternatives for this area should be analyzed for impact to growth management due to the area's potential for development. There have been several Title 5 failures in this area, according to the BOH database. Some failures resulted in variances for groundwater offset, leachfield area, and failed perc test. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at varied depths from 1.5 to 12 feet. Perc tests varied from 2 to 40 mpi. The varied soil and groundwater conditions allow some areas to support on-site wastewater disposal systems, while other areas show sever needs. Thus, the Tier 2 analysis determined that this was an area of need. The CWMP Phase II will analyze the alternatives for this area, while taking into account the varied needs and unprotected lands.

Study Area 7

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located southwestern portion of town, is 163 acres and in the Falulah/Baker watershed sub-basin. Roadways in this study area include Brown Avenue and portions of West Street.

The majority of the soils in this area have mixed drainage qualities and some locations of high groundwater. This area is zoned as Residence A. This area also includes several larger, undeveloped and unprotected parcels. There have been no Title 5 failures in this area, according to the BOH database. According to the Tier 1 analysis, there is a small portion of this area which shows potential need but lots in the area are large enough to accommodate conventional Title 5 septic systems or I/A systems.

Study Area 8

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located in the southwestern portion of town along the Fitchburg town line, is 102 acres and in the Falulah/Baker watershed sub-basin. Roadways in this study area include portions of Hollis Road and West Road.

This study area has some dense areas with small lots but there are also some larger, undeveloped and unprotected lands. This area is zoned as Residence A. The soils in this area are generally well drained and there are some areas of high groundwater. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 9 - Lake Whalom

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in some small sections of this study area. Presently viable alternatives for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is within the drainage basin for Whalom Lake, is 361 acres and in the Catacunamaug Brook watershed sub-basin. Roadways in this study area include Hollis Road, Crest Avenue, West Street, Rangeley Road, Sunny Hill Road, and Lakeview Avenue. The Board of Health commented that portions of this area are capable of supporting on-site fully complaint systems.

There are several areas of need, according to the Tier 1 analysis which showed above average needs. This study area has some dense areas with small lots but there are also some larger, undeveloped and unprotected lands. This area is zoned as Residence A. The soils in this study area are of varied drainage qualities. Sections of this area were observed to have some significantly mounded systems, high groundwater, and very steep slopes. It was also noted that this area had some older homes (60s-70s), wetlands, and built-out areas. According to the BOH database, there have been several Title 5 failures in this area. Some of the failures resulted in variances for groundwater offset and mounded systems. In general, groundwater was observed at depths from 2 to 3.5 feet. Perc tests varied from 2 to 40 mpi.

Study Area 10

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the western central portion of town, is 235 acres and in the Catacunamaug Brook watershed sub-basin. Roadways in this study area include Beal Street and unsewered portions of Massachusetts Avenue. This area is comprised of Residence A, Commercial, and Limited Business/Residential zoning districts. The Board of Health commented that portions of this area are capable of supporting on-site fully complaint systems.

The soils in this study area are of varied drainage qualities. Sections of this area were observed to have steep slopes, small lots, and wetlands. According to the BOH database, there have been several Title 5 failures in this area. Several failures resulted in variances for groundwater offset and I/A systems. In general, groundwater was observed at depths of approximately 2 feet. Perc tests varied from 6 to 30 mpi.

Study Area 11

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located on the northeastern side of Lunenburg along the Townsend town line, is 2,416 acres and in the Mulpus Brook watershed sub-basin. Roadways in this study area include Chase Road and Northfield Road.

The majority of the soils in this area are well drained and with some areas of high groundwater. This area is comprised of Outlying and Commercial zoning districts. This area also includes several larger, undeveloped and unprotected parcels. According to the BOH database, there have been some Title 5 failures in this area. Most failures were procedural and were corrected with infrastructure improvements. There were some variances for groundwater offset and I/A systems. The mounded systems in this areas are generally on larger lots where grading could blend mounded systems into the landscape. According to the Tier 1 analysis, there is a small portion of this area which shows potential need but this area is along a stream and the lots in the area are large enough to accommodate conventional Title 5 septic systems.

Study Area 12

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater disposal needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the northern central portion of Lunenburg, is 242 acres and in the Mulpus Brook watershed sub-basin. Roadways in this study area include Highland Street and Chestnut Street. This area is zoned a Residence A. The Board of Health commented that portions of this area are capable of supporting on-site fully complaint systems.

This area has above average needs according to the Tier 1 analysis. The soils in this study area are of varied drainage qualities with some areas of very poorly drained soils. Sections of this area were observed wetlands and high groundwater. In general, groundwater was observed at depths of approximately 2 feet. Perc tests varied from 6 to 30 mpi.

Study Area 13

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town’s Board of Health regulations. This study area, which is located on the western side of Hickory Hills Lake, is 187 acres and in the Mulpus Brook watershed sub-basin. In addition, the Woodlands WWTF is in this area. Roadways in this study area include Gilcrest Street and Valley Road.

The majority of the soils in this area are moderately well drained with some areas of high groundwater. This area is zoned as Residence A and has one larger, undeveloped and unprotected parcel. According to the BOH database, there has been one Title 5 failure in this area. During the visual analysis it was noted that there are some wetlands but the lots in the area are large enough to accommodate conventional Title 5 septic systems.

Study Area 14 (Hickory Hills Lake)

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which surrounds Hickory Hills Lake, is 774 acres and in the Mulpus Brook watershed sub-basin. Roadways in this study area include Townsend Harbor Road, Hemlock Drive, Cliffview Terrace, Brookview Terrace, Peninsula Drive, South Row Road, Cove Road, and Island Road.

This area has above average needs according to the Tier 1 analysis. This area has a mixture of well drained, excessively drained, and poorly drained soils. The lots in the area are small and there are no large, undeveloped and unprotected lots in the area. The area is primarily built out. In addition, several mounded systems were observed. The area includes portions of the ACEC as well as and priority and estimated habitats on the eastern side of the lake. This area is zone as Residence A.

According to the BOH database, there have been several Title 5 failures in this area. Some failures resulted in variances for groundwater offset, on-site wastewater disposal system area, failed perc test, bedrock offset, and lack of area due to small lots size. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at depths from 3 feet, although some areas reported groundwater at approximately 9 feet. Perc tests varied from 2 to 38 mpi.

Study Area 15

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the central portion of town, is 134 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include Lancaster Avenue, Meadow Lane, and Rolling Acres Road. There is one larger, undeveloped and unprotected parcel behind Rolling Acres Road. The area is zoned as Residence B.

This area has above average needs according to the Tier 1 analysis. The soils in this study area are moderately well drained and the groundwater levels are high. Small lots, severe slopes, and wetlands were observed during the Tier 2 visual analysis. There were a few Title 5 failures in this area, according to the BOH database. Some failures resulted in variances for groundwater offset and mounded systems. In general, groundwater was observed at depths between 2.5 and 4 feet. Perc tests varied from 13 to 19 mpi.

Study Area 16

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located in the southern central portion of Lunenburg, is 1,655 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include Kilburn Street, Page Street, and portion of Lancaster Avenue and Brown Avenue.

The majority of the soils in this area are well drained and with some areas of high groundwater. The area is zoned as Residence B. This area also includes several larger, undeveloped and unprotected parcels. There are some mounded systems in this area but they are generally on larger lots where grading could blend mounded systems into the landscape. According to the BOH database, there have been no Title 5 failures in this area. According to the Tier 1 analysis, there are several areas which show potential need but these areas are within wetlands. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 17

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located on the southeastern side of Lunenburg along the Leominster town line, is 753 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include Gibson Street and portions of Goodrich Street.

The soils in this area are varied and there are several areas with high groundwater. The area is zoned as Residence B. This area also includes several larger, undeveloped and unprotected parcels. According to the BOH database, there have been no Title 5 failures in this area. According to the Tier 1 analysis, there are several areas which show potential need but these areas are within wetlands and water resources are not considered to be an area of need. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 18

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located on the southeastern side of Lunenburg along the Shirley town line, is 692 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include Pioneer Road, Old Shirley Road, Leominster Road, and Fort Pond Road. The area includes one sewer connection to Leominster for Ecological Fibers at 40 Pioneer Drive.

According to the Tier 1 analysis, there is a small portion of this area which shows potential need but this area is comprised of streams and wetlands. The soils in this area are varied with large pockets of gravel and quarry pits. The area includes the Pioneer Industrial Park and is zoned as Office Park/Industrial. According to the BOH database, there have been no Title 5 failures in this area. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area. The town may want to consider treatment alternatives for this area to promote more intense economic development than can be supported by on-site wastewater disposal systems.

Study Area 19 (Lake Shirley)

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which surrounds Lake Shirley, is 1,295 and in the Catacunamaug watershed sub-basin. Roadways in this study area include Pearl Street, Sunset Lane, several Fire Lanes, and portions of Flat Hill Road and Reservoir Road. On the northern side of the lake there is one large, undeveloped and unprotected lot off of Burrage Street, and on the southern side there are a few large, undeveloped and unprotected lots. In addition, this study area abuts study area 18 which has several larger, undeveloped and unprotected lots. The Board of Health commented that many of the parcels within this area are large and have site conditions that are adequate for on-site disposal.

The area includes an industrial manufacturer of construction earth products, a campground, and a public beach. This area is comprised of Residence A, Residence B, and Commercial zoning districts. There are areas with severely steep slopes and the soils are extremely well drained. The lots adjacent to the lake are small and primarily built out. The houses at one time were primarily summer residences but many have converted to year-round residences.

This area has above average needs according to the Tier 1 analysis, and according to the BOH database, there have been several Title 5 failures in this area. Some failures resulted in variances for groundwater offset, distance to wetlands, distance to surface water, and distance to drinking water wells. Many of the variances were granted due to limited septic design possibilities. The surface water in this area is known for having elevated levels of phosphorus. Groundwater was observed at depths between 1 and 12 feet. In general, perc tests in the area were 2 mpi. The alternative analysis for this area could include low impact development bylaws and stormwater, nutrient and septic management plans.

Study Area 20

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of

Health regulations. This study area, which is located in the eastern central portion of Lunenburg, is 1,076 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include the Houghton's Mill Road, and portions of Page Street, Burrage Street, Arbor Street, and Reservoir Road.

The Zone II for the Water District wells on Lancaster Avenue is within this study area. There are above average needs in this area, according to the Tier 1 analysis due to the Zone II location. A septic management plan could be considered for this area due to potential Zone II impacts. The Lunenburg Water District is creating a Water Supply Assessment to preserve drinking water resources in this area and throughout Town.

The majority of the soils in this area are excessively well drained and there is adequate depth to groundwater. This area is zoned as Residence B. This area also includes several larger, undeveloped and unprotected parcels. According to the BOH database, there have been a few Title 5 failures in this area. The failures were either procedural or variances were approved for mounded systems. The mounded systems in this area are generally on larger lots where grading could blend mounded systems into the landscape. There is a small portion of this area which shows potential need but this area is along wetlands and streams. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 21

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town’s Board of Health regulations. This study area, which is located on the eastern side of Lunenburg along the Shirley town line, is 497 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include the portions of Longwood Drive, Elmwood Road, and Page Street.

The majority of the soils in this area are well drained and with some areas of high to groundwater. The area is comprised of Outlying and Residence A zoning districts. This area also includes several larger, undeveloped and unprotected parcels. According to the BOH database, there have been a couple Title 5 failures in this area. The failures were either procedural or variances were approved for mounded systems. The mounded systems in this area are generally on larger lots where grading could blend mounded systems into the landscape. According to the Tier 1 analysis, there is a small portion of this area which shows potential need but this area is in a wetland, and water resources are not considered to be an area of need. The lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 22

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located in the eastern central portion of Lunenburg, is 626 acres and in the Catacunamaug watershed sub-basin. Roadways in this study area include the Pine Street, Canterbury Drive and portions of Massachusetts Avenue and Arbor Street.

This village at Flat Hill maintains a WWTF in this area. In addition this area includes the Meadow Woods Trailer Park, which has already been defined by the Town as an area of need. The trailer park section is planned for a low pressure sewer extension. The Town should consider connecting other properties with need to the low pressure sewer.

The remainder of this area was determined to be well suited for conventional Title 5 septic systems, since the area which shows the most need, Meadow Woods Trailer Park, is in the process of being connected to low pressure sewer mains which will connect to the existing system. This area is comprised of Outlying and Residence A zoning districts. The area also includes several larger, undeveloped and unprotected parcels. The soils in this area are varied with poorly draining soils and high groundwater located in proximity to wetland areas. The majority of lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 23

Conventional Title 5 septic systems appear to be a viable long-term wastewater disposal solution for this study area. This area should be maintained in accordance with the Town's Board of Health regulations. This study area, which is located in the northeastern portion of Lunenburg, is 567 acres and in the Mulpus Brook watershed sub-basin. Roadways in this study area include Cross Street, Hunting Hill Road, and portions of Mulpus Road. This area is adjacent to Town and State forests.

The majority the area has well drained soils and adequate depth to groundwater. There are portions of this area with wetlands and bedrock. A few mounded systems were noted in the visual assessment. The mounded systems in this area are generally on larger lots where grading could blend mounded systems into the landscape. According to the BOH database, there have been no Title 5 failures in this area. This area has above average needs according to the Tier 1 analysis, due to wetlands and proximity to sensitive ecosystems. Thus, this area was determined to be adequate for conventional Title 5 on-site systems, but the Town should take note of this sensitive area. In general, lots in the area are large enough to accommodate conventional Title 5 septic systems and, as such, on-site conventional Title 5 septic systems are well suited for this area.

Study Area 24

Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater treatment in portions of this study area. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located on the northeastern side of Lunenburg along the Townsend town line, is 73 acres and in the Squannacook watershed sub-basin. Roadways in this study area include portions of Townsend Harbor Road. The soils in this area are varied and there several areas with high groundwater. The area is comprised of larger lots and is zoned as Outlying. This area also includes several larger, undeveloped and unprotected parcels. This area has above average needs according to the Tier 1 analysis. The area was determined to be a needs area based on soil, high groundwater and sensitive receptors and ecosystems. Wastewater alternatives for this area will be reviewed in conjunction with study area 14, Hickory Hills Lake.

This area will be reviewed since it abuts study area 14, although the Lunenburg Board of Health commented that this study area should be reduced significantly. Lots along the east side of Townsend Harbor Road near the old landfill and the Townsend line are generally adequate in size for on-site disposal. Many of the properties are newer construction with compliant systems.

4.2.15 Needs Assessment for Growth Management Districts

The Sewer Commission and the Planning Board approved the addition of two new study areas during the Tier II analysis. These new study areas are delineated utilizing the Town's Growth Management Districts for commercial and industrial development (GMDs). A majority of the GMDs are previously sewered or were defined as areas with need for potential study. The two new areas are the portions of the GMDs outside of those areas. The Planning Board will review these areas for potential for growth in regards to commercial and industrial development. Wastewater management for these areas will be reviewed during Phase II for the current disposal methods and the impacts of utilizing wastewater management to encourage development.

Study Area 25

The Town is considering the potential to encourage commercial and industrial development. Some communities provide public wastewater collection systems in selected areas to promote more intense economic development than can be supported by on-site wastewater disposal systems. Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater flow associated with commercial and industrial development. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the southeast portion of town, is 210 acres and in the Catacunemaug watershed sub-basin. The roadways in this study area are Pioneer Drive and Leominster-Shirley Road. There is mix of residential and commercial development in this area. The area is zoned as Office Park/Industrial

Study Area 26

The Town is considering the potential to encourage commercial and industrial development. Some communities provide public wastewater collection systems in selected areas to promote more intense economic development than can be supported by on-site wastewater disposal systems. Conventional Title 5 septic systems appear not to be sufficient for adequately addressing wastewater flow associated with commercial and industrial development. Alternatives to be reviewed for effectively addressing the wastewater needs in this study area are advanced on-site/I/A, community/cluster, or regional wastewater disposal systems. The recommended solution for this study area will be investigated and presented in the CWMP Phase II Management Techniques and Alternatives Identification and Screening.

This study area, which is located in the western/central portion of town, is 345 acres and in the Mulpus watershed sub-basin. The roadway in this study area is Chase Road (Route 13). There is mix of residential, agricultural, and commercial development in this area. The area is zoned as Residence A and Commercial.

4.2.16 Tier 2 Results

The Tier 2 analysis was conducted to calibrate the Tier 1 rating structure. The Tier 2 analysis determined: (1) if a given area showed consistent need; (2) areas where there was a conflict in need (e.g. areas that did not show a need in the first tier, but are known to be problem areas); and (3) areas of no need, where existing on-site wastewater disposal systems are adequate. The results of the Tier 2 analysis reviewed the areas with above average needs from Tier 1 which were Areas 4, 5, 9, 10, 12, 14, 15, 19, 20, 22, 23, 24. The results of the Tier 2 analysis resulted in Areas 5, 20, 22, and 23 being found to be adequately suited for conventional Title 5 systems, although each of these areas have sensitive receptors and ecosystems and should be managed accordingly. Conversely, Area 6 was determined to be an area that is not well suited for conventional Title 5 systems, and there are some large undeveloped and unprotected lots in this area. The potential for development in Area 6 should be considered in the wastewater systems alternatives analysis in CWMP Phase II. In addition, two new Areas 25 and 26 were included by the Sewer Commission and the Planning Board to review for potential growth management of commercial and industrial development.

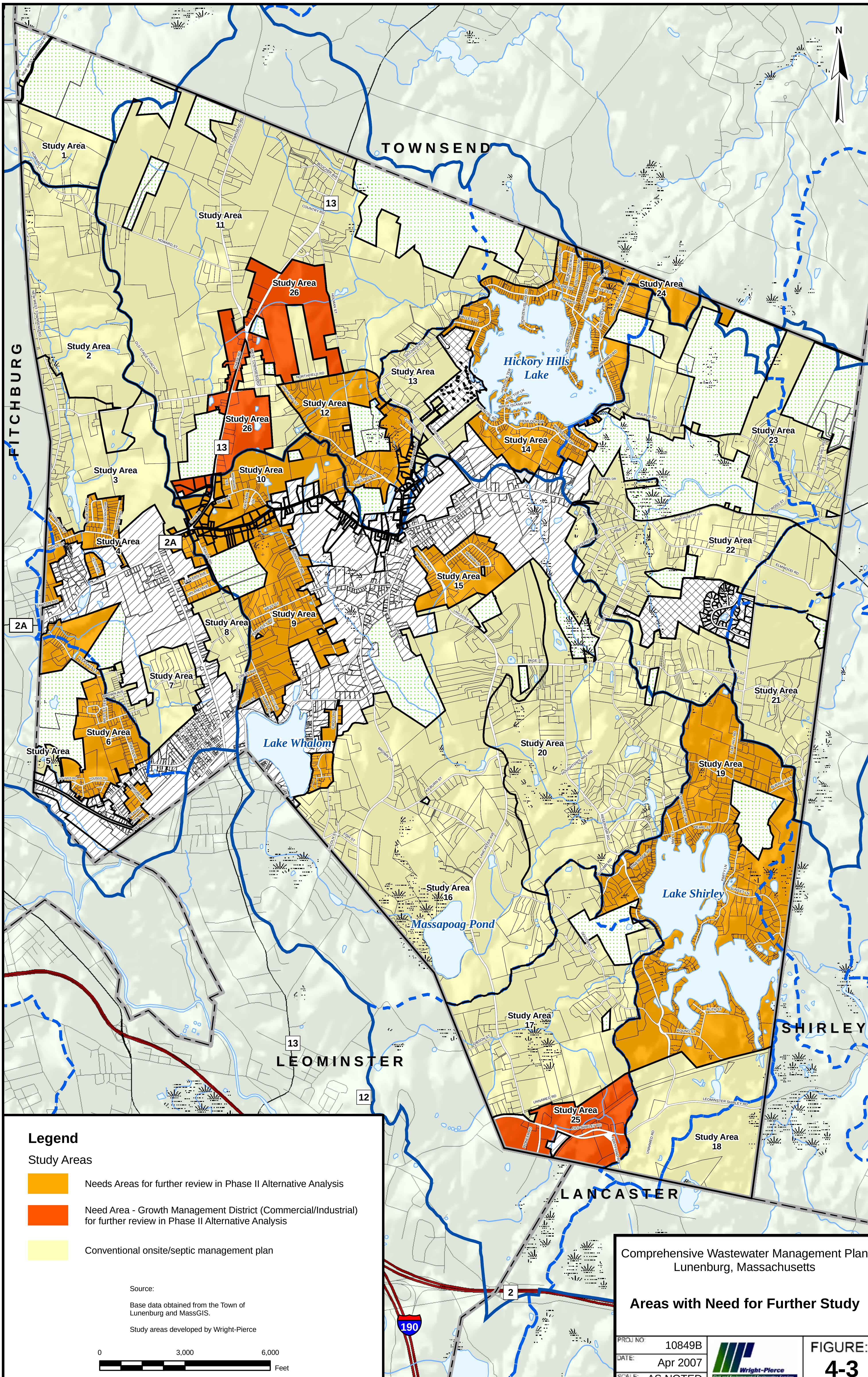
4.3 NEEDS AREA RECOMMENDATIONS

The needs assessment identified the suitability of properties for continued, long-term reliance on conventional on-site wastewater disposal systems. The needs assessment provides an overview in Figure 4-3 of areas that are:

- Are well suited for conventional on-site wastewater disposal systems for long-term wastewater management,
- Will be further studied for continued reliance on conventional on-site septic systems for long-term wastewater management, or
- Will be reviewed for potential growth management of industrial and commercial development.

4.3.1 Well Suited for Conventional Title 5 Systems

There are 15 study areas in Town which are well suited for the continued use of on-site systems. Some of these areas showed small portions of needs and the BOH should consider creating a septage management plan which would take into consideration minor areas of need. A septage management plan is usually developed with the local Board of Health and implemented for the areas of Town not included in the sewer service area. The purpose of a septage management plan is to maintain the operation of septic systems to protect the groundwater and natural resources. A plan should include items such as recommended septage pump out frequencies and maintenance of on-site wastewater disposal systems. Public education concerning the importance of proper maintenance of on-site wastewater disposal systems is an important means of prolonging the life of these systems.



TOWNSEND
FITCHBURG
LEOMINSTER
LANCASTER
SHIRLEY
N
Study Area 1
Study Area 2
Study Area 3
Study Area 4
Study Area 5
Study Area 6
Study Area 7
Study Area 8
Study Area 9
Study Area 10
Study Area 11
Study Area 12
Study Area 13
Study Area 14
Study Area 15
Study Area 16
Study Area 17
Study Area 18
Study Area 19
Study Area 20
Study Area 21
Study Area 22
Study Area 23
Study Area 24
Study Area 25
Study Area 26
Hickory Hills Lake
Lake Whalom
Lake Shirley
Massapoag Pond
13
2A
12
2
190
Legend
Study Areas
Needs Areas for further review in Phase II Alternative Analysis
Need Area - Growth Management District (Commercial/Industrial) for further review in Phase II Alternative Analysis
Conventional onsite/septic management plan
Source:
Base data obtained from the Town of Lunenburg and MassGIS.
Study areas developed by Wright-Pierce
0
3,000
6,000
Feet
Comprehensive Wastewater Management Plan
Lunenburg, Massachusetts
Areas with Need for Further Study
PROJ NO: 10849B
DATE: Apr 2007
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE: 4-3

4.3.2 Needs Areas Planned for Further Study

The Tier 1 and Tier 2 analyses determined that the Town has 11 areas with need for further study, or "Needs Areas". Conventional Title 5 septic systems may not be sufficient for adequately addressing wastewater treatment in portions of these study areas. This final grouping establishes a baseline for the areas to be considered in CWMP Phase II Management Techniques and Alternatives Identification and Screening. The needs areas are listed in Table 4-15.

TABLE 4-15
AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name
4	Lower Mass Ave
6	Baker Station
9	Lake Whalom
10	Mass Ave. / Beal Street
12	Highland Street
14	Hickory Hills Lake
15	Rolling Acres Road
19	Lake Shirley
24	Squannacook
25	Pioneer GMD*
26	Chase GMD*

* Growth Management District (Industrial/Commercial)

4.3.3 Wastewater Flow Estimates for Needs Areas

Existing and future wastewater flow estimates were estimated for the needs areas. These estimates are based on the same methodology utilized in Sections 2 and 3. The wastewater flows were estimated to utilize as a basis for alternatives "sizing" during the CWMP Phase II Management Techniques and Alternatives Identification and Screening. The quantity of wastewater flow a key factor in reviewing the wastewater treatment alternative options. The needs area wastewater flow estimates are included in Table 16.

TABLE 4-16

WASTEWATER FLOW ESTIMATES FOR NEEDS AREAS AND SEWERED AREAS FOR CWMP PHASE II

	Needs Areas	Estimated Existing Sanitary Flow 2006 (gpd)	Estimated Future Sanitary Flow 2026 (gpd)	Estimated Future I/I Flow 2026 (gpd)	Total Future Estimated Flow 2026[1]
4	Lower Mass Ave	24,900	26,500	19,900	46,400
6	Baker Station	36,500	39,600	29,700	69,300
9	Lake Whalom	34,600	37,200	27,900	65,100
10	Mass Ave. / Beal Street	20,600	23,400	17,600	41,000
12	Highland Street	13,900	14,900	11,200	26,100
14	Hickory Hills Lake	73,300	79,400	59,600	139,000
15	Rolling Acres Road	16,200	17,600	13,200	30,800
19	Lake Shirley	76,600	81,800	61,400	143,200
24	Squannacook	1,600	1,800	1,400	3,200
25	Pioneer Drive GMD	5,000	40,000[2]	30,000	70,000
26	Chase Road GMD	5,800	48,400[2]	36,300	84,700
	Total Estimated Study Area Flow	**309,000**	**411,000**	**308,000**	**719,000**
	Sewered Areas Presently Connected	93,000	400,000	103,000	503,000
	Sewered Areas Presently Unconnected	89,000	* Included above	N/A	N/A
	Proposed Developments in Sewered Areas	120,000	* Included above	N/A	N/A
	TOTAL Estimated for Phase II Alternatives Analysis	**611,000**	**811,000**	**411,000**	**1,222,000**

1 Total future flow is the sum of the estimated future sanitary flow and the estimated future I/I flow.

2 For Growth Management Districts, Year 2026 is flow not based on flow projections, but instead on the theoretical buildout flow. The Town wishes to see these areas developed to their full potential within the study period.

4.3.4 Management Techniques, Alternatives Identification and Screening

The CWMP Phase II - Management Techniques and Alternatives Identification and Screening will present draft recommendations for wastewater management in the identified needs areas of Lunenburg where on-site conventional Title 5 septic systems not provide adequate wastewater treatment. Specific recommendations by study area will take into account the appropriateness of utilizing septage management plans, stormwater management plans, nutrient management plans, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal. The CWMP Phase II will evaluate the environmental impacts and design criteria associated with each alternative and recommend the appropriate long-term solutions to the wastewater disposal problems in each needs area.

SECTION 5

PUBLIC PARTICIPATION

5.1 RELATIONSHIP BETWEEN PROPONENT AND PUBLIC

A public participation plan was developed for outreach strategies and activities. As part of this task, key contacts, such as municipal officials and representatives of regulatory agencies, were interviewed to identify short and long-term goals, gain an understanding of the issues and concerns related to the project and gauge the level of knowledge and interest about the issues and the project within the community.

One of the most important considerations of the CWMP process is to assure that all interested parties in the Town are included in the decision-making process. Communication between town officials, business owners, residents, utility companies and state agencies throughout the entire project is critical. The public participation approach is designed to solicit input from stakeholders and to identify technical and environmental issues, as well as cost savings measures early on in the process.

Implementation of the public participation process will result in a project that can be planned, designed and constructed in accordance with the Town's goals. As a result of the Town’s concern, this project is highly visible and will require completion within a set schedule. For those reasons, we feel that a team approach is most appropriate. The team approach will develop a consensus, among the interested parties as the project progresses, for meeting project deadlines and costs.

5.2 REQUIREMENTS FOR PUBLIC MEETINGS AND HEARINGS

Public meetings will be held at specific project milestone dates after completion of CWMP Phase I and CWMP Phase III. The public meetings will be held to discuss the alternatives and environmental impacts and other project concerns and impacts including funding and coordination efforts.

Board meetings were open to the public during the Phase I report development. A BOH Meeting was held on October 16, 2006, and the methodology for the Needs Assessment was presented. The audience included members of the Lunenburg Planning Board, as well as Lunenburg's Chief Administrative and Financial Officer (CAFO). A Sewer Commission meeting was held on October 31, 2006. At the meeting, the Needs Assessment and the Tier 1 results were presented. Public notices for each of these meetings were published and citizens were welcome.

5.3 SUMMARY OF PUBLIC PARTICIPATION

Wright-Pierce worked closely with the Town, the Sewer Commission, the Board of Selectmen, the Department of Public Works and the CAFO to develop and implement a responsive public participation program designed to ultimately build consensus for the recommended plan. Wright-Pierce, as part of the SRF loan application and administration process, prepared and submitted public participation guidelines as part of the scope of work to the Town and DEP prior to initiating the project. The purpose of this public participation program is to inform the public of the scope and progress of the planning study, to describe the results of the wastewater needs analysis, and to encourage public input throughout the entire planning process.

The Town is establishing three permanent information depositories for project information to be viewed by the public. These depositories are located at the Selectmen's Office in Town Hall, the DPW, and the Public Library. These depository sites are for displaying information generated during the CWMP process including:

- DEP SRF program information including the Project Approval Certificate;
- Approved Scope of Work;
- Legal advertisements and press releases published for public meeting notification;
- Newspaper articles;
- Project implementation and meeting schedules;
- Project progress reports, findings and recommendations, and
- Draft and final versions of the CWMP reports.

APPENDIX A
Acronyms

APPENDIX A

LIST OF ACRONYMS

ACEC.........................Areas of Critical Environmental Concern
APR...........................Agricultural Protection Restrictions
AUL ....Activity and Use Limitation
BVW ....Bordering Vegetated Wetlands
CAFO.........................Chief Administrative and Financial Officer
CDM ....Camp Dresser McKee
CMR...........................Code of Massachusetts Regulations
CSO............................Combined Sewer Overflow
CWMP ....Comprehensive Wastewater Management plan
DCR ....Department of Conservation and Recreation (formerly DEM)
DEP ....Department of Environmental Protection
DFW...........................Department of Fish and Wildlife
DHCD ....Department of Housing and Community Development
EIR ....Environmental Impact Report
ENF ....Environmental Notification Form
EOEA.........................Executive Office of Environmental Affairs
FEMA ....Flood Emergency Management Agency
GIS ....Geographic Information System
GMD………………..Growth Management District
IMA............................Intermunicipal Agreement
ISDS...........................Individual Subsurface Disposal Systems
MADEP......................Massachusetts Department of Environmental Protection
MBE...........................Minority-Owned Business Enterprise
MEPA ....Massachusetts Environmental Policy Act
MGL...........................Massachusetts General Law
MRPC ....Montachusett Regional Planning Commission
NASHOBA BoH........Nashoba Associated Boards of Health
NHESP.......................Natural Heritage & Endangered Species Program
NOAA........................National Oceanic and Atmospheric Administration
NPDES.......................National Pollution Discharge Elimination System
NRCS.........................Natural Resources Conservation Service
NRWA ....Nashua River Watershed Association
ORWs ....Outstanding Resource Waters

PAH............................Polyaromatic Hydrocarbons
PWS ....Public Water Supply
RBC............................Rotating Biological Contactor
SRF ....State Revolving Fund
US EPA ....United States Environmental Protection Agency
USGS ....United States Geologic Survey
UST ....Underground Storage Tank
WBE...........................Woman-Owned Business Enterprise
WMA ....Water Management Act
WRC ....Water Resources Commission
WWTF ....Wastewater Treatment Facility

APPENDIX B
Glossary

APPENDIX B

GLOSSARY

303d List	303d refers to a section in the federal Clean Water Act requiring all states to submit, biennially to the EPA, a list of waterways not meeting assigned water quality standards. The 303 d is a list of the known impaired waters in a state or on tribal lands.
7Q10	7Q10 is the lowest consecutive 7 day stream flow that is likely to occur in a ten year period in a particular river segment
Activity and Use Limitation (AUL)	A Grant of Environmental Restriction or Notice of Activity or Use Limitation recorded, registered, or filed in accordance with 310 CMR 40.1070 through 310 CMR 40.1099
Agricultural Protection Restrictions (APRs)	Similar to a conservation restriction, Chapter 132A Sec. 31 allows the state to purchase an Agricultural Preservation Restriction on farmlands, restricting use of the land to agricultural activities.
Aquifer	An underground geologic formation capable of holding large quantities of water. Aquifers may serve as a source of drinking water.
Areas of Critical Environmental Concern (ACEC)	The ACEC program regulates designations of ACECs and directs the EOEA to take actions, administer programs and revise regulations to preserve, restore, and enhance the natural and cultural resources of ACECs.
Basin	A topographic designation based on drainage patterns. The water flowing within a basin (or watershed) eventually flows to one common point. The state has been divided into 27 major basins under the Watershed Initiative.
Best Management Practices (BMPs)	Techniques which may be nonstructural, structural or managerial capable of effectively and economically reducing nonpoint sources of pollution.
Chapter 40B	A state statute which enables local Zoning Boards of Appeals (ZBAs) to approve affordable housing developments under flexible rules if at

least 20-25% of the units have long-term affordability restrictions.

Chapter 40R Provides financial incentives to communities that establish a state approved smart growth zoning district (SGZD). Within the zone, towns are required to allow for denser residential development. In addition, at least 20 percent of the housing developed within a SGZD must be affordable to households making 80 percent of area median income.

Chapter 40S Addresses the potential impact on education costs, and creates a Smart Growth School Cost Reimbursement Fund to provide full reimbursement for any net new education costs resulting from housing units built under 40R.

Chapter 61, 61A or 61B A manner by which lands can be classified as Forest Lands in a process overseen by the MA Department of Environmental Management. Lands certified as Forest Lands are taxed, at a special rate, according to provisions established in Chapter 61. Chapter 61A is the section of Chapter 61 applicable to agricultural and horticultural lands and 61B is the section dealing with recreational lands eligible for special tax assessments.

Clean Water Act (CWA) A federal law establishing comprehensive national policies for water quality management. The essence of the CWA is to have all US waters "fishable and swim able".

Community Preservation Act In 2000, the Community Preservation Act (CPA) was passed in Massachusetts providing the opportunity for communities to choose to establish a local fund to be used for open space protection, historic preservation and the creation of low and moderate income housing. To establish a fund, communities must pass by referendum a property tax of up to 3% dedicated to their Community Preservation Fund.

Disposal Sites Disposal sites are locations where there has been a release of oil or hazardous materials to the environment.

Effluent Used water as it leaves a treatment system. Examples are discharges from sewage treatment facilities or water used in an industrial cooling system.

Eutrophic Pond A pond receiving an excess of nutrients, especially phosphorus, from the surrounding watershed will experience a greatly accelerated rate of plant growth. Plant growth and decomposition is a natural process but when the nutrients cause excessive growth the natural system is overwhelmed. The result is often thick plant and algae growth in a pond, loss of biodiversity, stressful conditions for aquatic life and the potential for complete collapse of the natural ecosystem.

Executive Office of Environmental Affairs (EOEA) The Executive Office of Environmental Affairs was established by the Legislature in 1975. The General Laws of Massachusetts Chapter 21A Section 2 outlines the overall duties and functions; inter-agency information, services and plans; and filing applications that are the purview of the office. The overall mission of the Massachusetts Executive Office of Environmental Affairs (EOEA) is to safeguard public health from environmental threats and to preserve, protect, and enhance the natural resources of the Commonwealth.

Geographical Information System (GIS) A relatively new and useful computerized system able to create data layers amenable to transfer onto maps and other useful products for assessing a river basin. Data layer examples include all open space, watershed boundaries, and land use.

High Stress Net average August outflow equals to or exceeds estimated natural August average flow.

Impervious Surface A surface, which does not allow water to penetrate such as pavement.

Interbasin Transfer A transfer of drinking water from one basin into another. These transfers are regulated by the state.

Interim Wellhead Protection Area Interim Wellhead Protection Area (IWPA) means that for public water systems using wells or wellfields that lack a Department approved Zone II, the Department will apply an interim wellhead protection area. This interim wellhead protection area shall be a one-half mile radius measured from the well or wellfield for sources whose approved pumping rate is 100,000 gpd or greater. For wells or wellfields that pump less than 100,000 gpd, the IWPA radius is proportional to the approved pumping rate which may be calculated according to the following equation: IWPA radius in feet = (32 x pumping rate in gallons per minute) + 400. A default IWPA radius or an IWPA radius otherwise computed and determined by the Department shall be applied to transient non-community (TNC) and non-transient non-community (NTNC) wells when there is no metered rate of withdrawal or no approved pumping rate.

Invasive Plants/ Invasive Species These are plants or animals able to quickly and easily populate an area or habitat. They are usually very adaptable and can take advantage of and tolerate disturbed or unstable conditions. The end result is typically a loss in natural diversity in the area and diminished value as habitat for birds, animals and native species.

Large Quantity Toxic Users Any toxics user who manufactures, processes or otherwise uses any toxic or hazardous substance in an amount the same as or greater than the applicable threshold amount in a calendar year at a facility.

Low Stress No net loss to the sub-basin on an average annual basis.

MA Executive Order 385 Planning for Growth, issues in 1996, this executive order established a framework within which state agencies could cooperatively plan for growth and protect natural resources.

MA Executive Order 418 Enacted January 2000, EO 418 is comprised of two components: Community Development Planning and Housing Certification. Together these two initiatives establish a comprehensive new approach to identifying suitable locations for new housing opportunities in Massachusetts, providing communities with needed resources and incentives for housing production, while considering the existing infrastructure and regional economy and preserving the unique character and valuable open spaces of its towns and cities.

MassGIS The Massachusetts geographic information system. See Geographic Information System (GIS), above.

Medium Stress Net 7Q10 outflow equals or exceeds estimated natural 7Q10 flow.

National Pollution Discharge Elimination System (NPDES) A federal program under the Clean Water Act created to monitor point source discharges such as sewage treatment plant effluent and industrial discharges.

National Resource Conservation Service The National Resource Conservation Service (NRCS) interim soil survey report identifies the general spatial extent of soil units, and describes expected depth to groundwater, bedrock, and soil permeabilities for each soil unit to a depth of 6 feet. While the NRCS soil survey is not suitable for site specific analysis, it is very useful for planning purposes, especially when used in conjunction with site specific soil testing data from Board of Health records. The correlation between NRCS soil units and site specific design information can be quite good, and some states use soil units identification as the sole basis for residential septic system leachfield sizing. The key information derived from NRCS soils is Drainage class, depth to groundwater, and depth to bedrock.

Natural Heritage & Endangered Species Program (NHESP) The Natural Heritage & Endangered Species Program (NHESP), part of the Massachusetts Division of Fisheries and Wildlife. NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state.

Needs Area A "Needs Area" is defined as a Study Area which will be further reviewed in Phase II.

Nitrate A form of nitrogen readily usable by vegetation. Excessive amounts of nitrate can disrupt ecological balances in a natural system. High levels of nitrate in drinking water pose a health threat especially for children (blue baby syndrome).

Non-native Plants Plants from another region or continent introduced to an area. Non native plants usually do not have the same checks and balances in place, as is the case with native species, and the result is often rampant invasion by the non natives. Areas dominated by these plants may not be useful to native species for food, shelter or habitat and usually displace the native plant community.

Nonpoint Source Pollution (NPS) Pollution originating from multiple and not easily identifiable sources. Storm water is a significant contributor of nonpoint pollutants since it washes pollutants from impervious surfaces such as roadways.

Nuisance Species A plant or animal prone to causing problems in ecosystem function or to the health, enjoyment, or aesthetic value of an ecosystem.

On-site Systems An individual system for treating wastewater, commonly called a septic system.

Outstanding Resource Water (ORW) According to 314 CMR 4.00: "Certain waters shall be designated for protection under this provision in 314 CMR 4.06(3) including Public Water Supplies (314 CMR 4.06(1)(d)1.). These waters constitute an outstanding resource as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values. The quality of these waters shall be protected and maintained."

Phosphorus A nutrient often serving as the limit to growth in freshwater systems. Excessive amount of phosphorus in a water body can lead to a condition of unchecked plant growth known as eutrophication.

Polyaromatic Hydrocarbons (PAHs) Hydrocarbon compounds typically found in heavier oils such as waste oil.

Right of First Refusal *To encourage landowners to keep their land as open space* – that is, not developed into residential, commercial or industrial uses – the MA Commonwealth passed Chapter 61 (Forestry), Chapter 61A (Agriculture & Horticulture) and Chapter 61B (Recreation) of the Massachusetts General Laws. These three classifications of the Chapter 61 program are designed to give favorable tax treatment to landowners who will keep their land undeveloped and managed according to certain criteria. A requirement of enrolling in Chapter 61, Chapter 61A or 61B programs (similar in effect to NH's "Current Use" Program) is that the municipality is given the "right of first refusal" to purchase the property within 120 days of presentation of a Purchase and Sale agreement (and at the P&S price) if the land use of the property is to change from "undeveloped" to "developed". The municipality has the ability to transfer its RFR to a non-profit conservation organization as well.

Riparian Relating to or living or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater.

Soil Absorption System A system of trenches, galleries, chambers, pits, fields(s) or bed(s) together with effluent distribution lines and aggregate which recievs effluent from a septic tank or treatment system.

Squannassit Regional Reserve Initiative The Squannassit Initiative is a coalition of individuals, municipalities, and non-profit organizations dedicated to preserving the existing natural ecology and cultural heritage in the northern part of the Massachusetts, including land in the towns of Groton, Dunstable, Ayer Lunenburg, Pepperell, Shirley, Townsend, and Ashby. Initiative seeks to preserve the integrity of the Squannassit ecosystem by protecting critical links, which allow wildlife to move among major protected blocks of land and by expanding the protected lands to include other ecologically and culturally important areas. It seeks to protect the cultural heritage by documenting its history and protecting historic lands and landscapes. In Spring 2002 the Initiative submitted to MA EOEA nominations for the Squannassit and Petapawag regions as Areas of Critical Environmental Concern. In December 2002 these two ACECs were officially designated by the state. The Nashua River Watershed Association provides coordination for the Initiative.

State Revolving Fund (SRF) A fund from which a community can apply for zero interest loans to assess or improve wastewater problems in the community. Scope of the

SRF has recently been expanded.

Study Areas Study Areas are areas of similar characteristics and land use patterns within the entire Town that were analyzed for sustainability of conventional Title 5 on-site systems.

Title 5 The Massachusetts regulation overseeing on-site wastewater treatment systems. Improperly or poorly functioning on-site systems (Septic Systems) have the potential to adversely impact nearby waterways.

Tributary A stream or river flowing into a larger, mainstream river.

Vernal Pool Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rising ground water and rainfall and remain ponded through the spring and into summer. Vernal pools dry completely by the middle or end of summer each year, or at least every few years.

Wastewater Water, which is used for some purpose, then discarded or "wasted". Usually refers to the water used in households, business and industry and containing wastes.

Water Management Act (WMA) (MGL Chapter 21 G) The intent of the WMA is to manage water uses, maintain safe yields, and plan for future water needs and this is done through the issuance of permits to withdraw set volumes of water from ground and surface supplies. The MA Dept. of Environmental Management administer the WMA based on decisions made by the Water Resources Commission.

Watershed An area of land contributing runoff and subsurface flow to one common point. Large watershed may be divided into smaller sub-watersheds.

Wetland Area of land with saturated or nearly saturated soils most of the year and serves as an interface between land-based and water-based environments.

APPENDIX C

Final MEPA Certificate

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, MA 02114-2119

JANE SWIFT
GOVERNOR

BOB DURAND
SECRETARY

Tel. (617) 626-1000
Fax (617) 626-1181
http://www.magnet.state.ma.us/envir

March 18, 2002

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE FINAL ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	:	Lunenburg Comprehensive Wastewater ManagementPlan
PROJECT MUNICIPALITY	:	Lunenburg
PROJECT WATERSHED	:	Nashua River
EOEA NUMBER	:	12160
PROJECT PROPONENT	:	Town of Lunenburg
DATE NOTICED IN MONITOR	:	April 8, 2000

As Secretary of Environmental Affairs, I hereby determine that the Single Environmental Impact Report (SEIR) submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (M.G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00).

The project involves the construction, in three phases, of a wastewater collection system over a 20-year planning period. The proposed system will serve an estimated 9000 residents generating an average 734,600 gallons per day (gpd) of wastewater (2,720,000 gpd peak). All wastewater will be treated at either the Leominster or Fitchburg wastewater treatment facilities. The Town of Lunenburg has inter-municipal agreements with both cities for treatment of up to 500,000 gpd. The project's proposed full build flow estimates are 485,000 gpd to Leominster and 249,000 to Fitchburg.

As described in the Single EIR, the Phase I service area, consisting of the Town center, a new public school, the proposed new public safety building, and the Whalom area, has the greatest potential to significantly impact groundwater quality. I granted the proponent a Phase I Waiver for the construction of 62,000 feet of new sewers and three sewage pumping stations on May 26, 2000.

The Phase II service area, located in the southwestern section of Lunenburg, will include lower Massachusetts Avenue and Baker Station. Phase III will service the lakefront areas of Hickory Hills and Lake Shirley, located in northern and southeastern Lunenburg respectively.

The project involves the construction of more than 10 miles of new sewer and is therefore subject to the Mandatory Environmental Impact Report provisions of the MEPA regulations pursuant to Section 11.03 (1). The project requires a Sewer Extension Permit from the Department of Environmental Protection (DEP). The project involves financial assistance from the Commonwealth, and therefore, MEPA jurisdiction extends to all aspects of the project that might have a significant impact on the environment.

The scope of the Single EIR, established in the Expanded ENF Certificate issued May 26, 2000, requested the Single EIR to include an analysis of impacts from all Phases of the project. In particular, the Single EIR was required to address the project's potential impacts on Lunenburg's agricultural lands, the potential for additional project-stimulated growth within the areas to be sewered and local hydrology. The Single EIR also required the proponent to provide responses to issues raised in the comment letters received on the Expanded ENF. I find that the Single EIR has fulfilled that requirement and that the proposed Section 61 Findings provide sufficient mitigation to minimize potential impacts.

Impacts on Lunenburg's Agricultural Lands. In response to the comments received from the Massachusetts Department of Food and Agriculture (DFA), the proponent has identified existing agricultural lands located within the proposed areas to be sewered, including the town-owned Woodruff parcel, that enjoy some measure of protection from development. In addition to parcels permanently protected from development through a state administered permanent agricultural preservation restriction (APR) and town-owned land areas that are generally considered as open space and not at risk for development, the proponent offers Lunnenburg's demonstrated history of exercising its option to acquire available Chapter 61 lands as an effective means of addressing growth pressures to agricultural lands within the proposed areas to be sewered.

According to comments received from DFA, the Town has agreed to work with DFA to apply for an APR on the Woodruff farm and to use the funds received to purchase other agricultural lands as they become available. I note that any future conversion to non-agricultural uses, or any loss of the existing agricultural lands that are identified in this EIR as being located within the proposed project area, would be subject to the mitigation requirements of Executive Order 193. Furthermore, the conversion to non-agricultural use or loss of existing agricultural lands located within the areas to be sewered would constitute a change in the project, requiring the filing of a Notice of Project Change. I also encourage the Town of Lunnenburg to work with local and regional land trust organizations and the Department of Food and Agriculture to develop an effective cooperative program for acquiring Chapter 61 lands as they may become available in the future.

Impacts on New Growth in Sewered Areas. With respect to Executive Order #385 (Planning for Growth) the Town of Lunnenburg has in place a number of tools for managing growth resulting from the project. The Town has determined that the *Phased Growth* provision of its By-Laws (Article 4.11) limiting new building permits to 45 per year, coupled with its decision to maintain the current 1 and 2 acre zoning requirements for single family residential lot size in areas to be sewered, will mitigate the adverse impacts of new development that is likely to be stimulated by sewers. I expect that the Town will continue its efforts to enact additional controls. I suggest that the Town consult with the Montachusett Regional Planning Commission and other communities regarding specific language for control measures and experiences in enacting and using these control measures.

Additional control measures can be included in the Final Facilities Plan and during the design and permit review process leading to the issuance of Sewer Extension Permits. The Town should note the attached comments and should attempt to incorporate suggestions contained in those comments into final design of the project where they are appropriate.

Finally, the proponent should be aware that if the project should change, a Notice of Project Change must be filed so that I may determine if further environmental review is needed.

March 18, 2002
DATE

Bob Durand

Comments received:

1/25/02	Massachusetts Department of Food and Agriculture (MDFA)
1/31/02	Town of Lunenburg
2/4/02	Town of Lunenburg
2/1/02	Town of Lunenburg
2/11/02	Massachusetts Department of Environmental Protection (DEP)
3/11/02	Massachusetts Department of Food and Agriculture (MDFA)
3/13/02	Town of Lunenburg

JW/NCZ/ncz

N 2

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Regional Office, 627 Main Street, Worcester, MA 01608

JANE SWIFT
Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

February 11, 2002

Secretary Robert Durand
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, MA 02114

RECEIVED
FEB 19 2002
MEPA

Attention: MEPA Unit –Richard Foster

Re: Single EIR
Comprehensive Wastewater Management Plan
Lunenburg, MA
EOEA # 12160

Dear Secretary Durand,

The Department of Environmental Protection (the Department) Central Regional Office offers the following comments on the SEIR for the Town of Lunenburg Comprehensive Wastewater Management Plan (CWMP). The report recommends a phased construction of a wastewater collection system during a 20 year planning period to serve an estimated 9,000 residents contributing an average of 733,400 gallons per day (gpd) of wastewater (2,720,000 gpd peak). The areas of town to be sewered are Whalom/Town Center, Lake Shirley and Hickory Hills. All wastewater will be treated at either the Leominster or Fitchburg East wastewater treatment facilities. The Town of Lunenburg has current inter-municipal agreements with both cities for 500,000 gpd. Current full build out estimates of flow are 249,600 gpd to Fitchburg and 485,000 gpd to Leominster.

A Phase I Waiver was issued in 2001 for a small section of sewer to serve Pioneer Park Industrial complex. These sewers will be connected to existing municipal sewer systems in Leominster.

The total project will result in a net transport of water resources from the Mulpus, Catacoonamug and Falulah Sub-basins. The report applied a hydrologic inflow/outflow water balance model for these sub-basins developed by CDM, Inc. The results of this model evaluation concluded that the additional stress created by the project falls within acceptable limits.

However, the SEIR recommends that the hydrologic impacts in the Catacoonamaug Sub-basin be re-evaluated prior to proceeding with Phase III (Lake Shirley). This office concurs that a more detailed evaluation of a neighborhood wastewater collection and treatment system for Lake Shirley be performed.

The DEP Central Regional Office appreciates the opportunity to comment on this proposed project and finds the SEIR to be adequate. If you have any questions regarding these comments, please do not hesitate to contact me at (508) 792-7650 *4033.

Sincerely,

Mary Gardner

Mary Gardner
Acting Deputy Regional Director

cc: Robert W. Golledge Jr., Regional Director, CERO
Paul Anderson, Municipal Coordinator, CERO
Dave Murphy, DEP, Boston

n2

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF FOOD AND AGRICULTURE
LANCASTER FIELD OFFICE
142 OLD COMMON ROAD, LANCASTER, MA 01523 (508) 792-7711 FAX: (978) 365-2131

JANE SWIFT
Governor

BOB DURAND
Secretary

JONATHAN L. HEALY
Commissioner

MEMORANDUM

RECEIVED
MAR 11 2002
MEPA

To: Bob Durand, Secretary
Executive Office of Environmental Affairs

Attn: Nicholas Zavolas, MEPA Office

From: Marcia Starkey MS

Re: EOEA #12160 SEIR Comprehensive Wastewater Management Plan Lunenburg

Date: 11 March 2002

The extended comment period for this Final Environmental Impact Report has provided an opportunity for further discussion with the proponent on potential impacts to agricultural land and the possibility of mitigating those impacts through an agricultural preservation restriction (APR) on the town-owned Woodruff farmland.

According to the FEIR, the extension of sewer along Leominster Road is proposed as a means to provide service to the largest number of properties, rather than as an area targeted for growth. This route will unintentionally increase development pressure on approximately 150 acres of agricultural land. In addition, approximately 50 acres will be similarly impacted by other proposed lines. Executive Order 193 and the Agricultural Lands Mitigation Policy would apply to these lands insuring permanent protection of equivalent agricultural lands, or a financial contribution of $10,000. per impacted acre to be used for such protection.

Town officials have pledged to continue agricultural leasing of the 128 acre Woodruff farm for the forseeable future. As this commitment is limited to present town officers, the Department has accepted the Town's proposal to apply for an APR on the Woodruff farm at this time, and to use the funds received to purchase other land. We expect the Town to send a letter of intention to the MEPA office within the next several days.

If completed, the Town's plan and an APR on the Woodruff farmland could provide advance mitigation for private lands taken out of agricultural use along the sewer routes, thereby greatly reducing and possibly eliminating agricultural mitigation in the future. If the APR is not completed, full mitigation as described above will be required.

C/Stanley D. Elkerton, Elkerton, Guertin & Associates, Inc.
Town of Lunenburg
DEP/CERO

Bill Gustus, Town Manager.

APPENDIX D
Revised Scope for CWMP

APPENDIX D

TOWN OF LUNENBURG, MASSACHUSETTS
COMPREHENSIVE WASTEWATER MANAGEMENT PLAN (CWMP)
SCOPE OF SERVICES

<u>Task No. 1</u>

1 PUBIC INVOLVEMENT PROGRAM, PROJECT MANAGEMENT/ADMINISTRATION AND REGULATORY COORDINATION

1.1 Assist the Town in the establishment of a Project Advisory Committee (PAC).

1.1.1 The comprehensive and complex nature of the CWMP for Lunenburg will incorporate the involvement of many varied stakeholders. Stakeholders may include: the Lunenburg Board of Selectmen, Board of Health, Finance Committee, Conservation Commission, and Planning Board; Lake Shirley Association and Hickory Hills Landowners; Citizen's of Lunenburg; Massachusetts Department of Environmental Projection (DEP,) Department of Environmental Management (DEM,) Department of Fish and Wildlife (DFW) Natural Heritage Program, Water Resources Commission (WRC,) and the MEPA-Unit; the Nashua River Watershed Association (NRWA), Montachusset Regional Planning Commission (MRPC), and officials from neighboring communities (Fitchburg and Leominster in particular). All stakeholders, including governmental agencies, will have representation on the PAC, and members will be responsible for conveying information to and from their constituents. The PAC will offer technical input and general advice in the planning process.

1.2 Conduct two (2) public information meetings and one (1) public hearing. Public meetings to be held at specific project milestone dates after completion of CWMP Phase I and CWMP Phase III. Public Hearing to be held at completion of the CWMP Phase IV - Draft CWMP.

1.3 Prepare and submit a detailed Scope of Services (Plan of Study) to DEP for review and approval at the project outset. This is a requirement of the SRF Loan program. Intent is to have the Scope of Services that is included in the Agreement with the Town be similar to the document that is submitted to DEP for review and approval. Any changes to the Scope of Services by DEP that are not included in the Agreement Scope of Services between the Town and Wright-Pierce will be subject to an associated amendment to the fee for the project.

1.4 Prepare and submit SRF Loan Application and assist Town in obtaining SRF funding approval for the project.

1.5 Regulatory Coordination: Contact MEPA to review Town's options regarding "syncing" this planning effort with the previous CWMP/EIR. *It is anticipated that a new Environmental Notification Form will be required for this planning. Preparation of a*

ENF is included in the Scope of Services. A MEPA EIR is not included in this Scope of Services.

1.6 Prepare and submit monthly invoices and, include a one page monthly progress report with each invoice.

1.7 Attend monthly project meetings with the PAC and/or Lunenburg officials.

Task No. 2

2 PHASE I – EXISTING CONDITIONS, FUTURE REQUIREMENTS AND PROBLEM IDENTIFICATION/NEEDS ASSESSMENT

2.1 Assemble and review relevant prior studies of Lunenburg wastewater and master planning issues prepared by consultants and other organizations and use all relevant and current information and, create a project library for use during this CWMP project. It is assumed that Town staff will assemble and provide the necessary prior studies and relevant information to WP. The fundamental studies that will be used as the primary basis for this plan include:

- Wastewater Management Plan by Universal Engineering Corporation - June 1999;
- Single EIR for Comprehensive Wastewater Management Plan by Guertin Elkerton & Associates, Inc. - December 2001;
- Interim Wastewater Management Planning Work by SEA – 2005.
- Water Supply Assessment Study by Dufresne-Henry - 2006

The intent in this section is to reuse all relevant and accurate information from the above noted studies and update the available relevant information via critical evaluation of the data used and the interpretation of such, and collect, evaluate and properly interpret all relevant new data available specific to existing wastewater management systems.

2.2 General Environmental Conditions in and around Lunenburg (Town staff to assist in this task)

2.2.1 Description of Basin-Wide Initiatives and Other Facilities Plans for Town's Watershed Basin.

2.2.1.1 Compile a bibliography of existing reports, plans and initiatives that impact the use and conditions of Lunenburg and the watershed basin. NRWA, MRPC, DEM, DEP, EPA, and other entities may all recommend plans for inclusion in the bibliography.

2.2.1.2 Identify important components of other plans that may impact Lunenburg's wastewater management plans.

2.2.1.3 Compile information for the three Lunenburg Nashua River sub-watersheds, Catacunamaug, Mulpus (medium-stressed) and Falulah.

2.2.2 Description of the Town's built/human environment [desktop study]

2.2.2.1 Review and integrate relevant information presented in the previous CWMP, Facilities Plans, the Town's Master Plan, census data, zoning regulations and currently planned and future large scale developments to describe the current population and land uses within the Town.

2.2.2.2 Meet with the Lunenburg Conservation Commission and Planning Board to describe recent and anticipated development trends, both residential and commercial, and to describe any conservation or open space efforts, including any wetlands conservation by-laws.

2.2.2.3 Indicate locations of conservation land on base map. It is understood and agreed that the base map will be created based exclusively on data layers available from Mass GIS.

2.2.3 Description of the natural environmental systems**,** with Tasks 2.2.3.3 through 2.2.3.10 based on reviewing and summarizing information compiled in previous studies.

2.2.3.1 Meet with NRWA and MRPC to identify issues and locations of critical environmental concern.

2.2.3.2 Meet with the Lunenburg Conservation Commission to identify issues and locations of critical environmental concern.

2.2.3.3 Describe the regional climate conditions using available recent NOAA data.

2.2.3.4 Describe the soils in Lunenburg using current NRCS soils conditions reports and maps as informational sources. BOH database information on soils, perc rates and groundwater information will also be used. The BOH Agent will be interviewed to gather specific field observations and experiences regarding Lunenburg soils information. Indicate areas containing soils that are poorly suited to onsite disposal on the base map.

2.2.3.5 Describe the regional hydrologic conditions using current reports published by USGS, DEM, NRWA, or other agencies as informational sources.

2.2.3.6 Describe the regional hydrogeologic conditions using previous reports published by USGS, DEM, NRWA, MRPC or other agencies, and reports prepared for the Town's wells as informational sources.

2.2.3.7 Describe the regional water quality conditions using the latest reports from the BOH summer water quality testing for Lake Whalom and Hickory Hills and the Lake Shirley Shady Point beach area water quality testing (from the Park Owner) and other reports as published by USGS, DEM, DEP, EPA, NRWA, MRPC or other agencies as informational sources. Indicate the locations of any historically troubled surface water bodies on the base map.

2.2.3.8 Describe the wetlands or species habitats in Lunenburg using latest reports published by the Conservation Commission, DEM, Natural Heritage, NRWA, MRPC or other agencies as informational sources. Indicate these locations on the base map.

2.2.3.9 Describe the flood plain locations in Lunenburg using current FEMA maps as informational sources. Indicate these locations on the base map.

2.2.3.10 Describe the regional air quality and noise conditions using current DEP, EPA and other available informational sources.

2.2.4 Compile the information from Task 2.2 into a draft of Chapter 1 of the CWMP Phase I submittal.

2.3 Water Demand Projections and Supply Sources

2.3.1 It is our understanding that the Lunenburg Water District has contracted with a consultant to perform a Water Supply Assessment Study and this Study is slated for completion in April 2006. Wright-Pierce will summarize the results of this study into Chapter 2 of the CWMP Phase I submittal, emphasizing the following items:

2.3.1.1 A brief description of the Town's water system;

2.3.1.2 A determination of water use trends and future water demands, A summary of future well sites;

2.3.1.3 A review of past water conservation efforts and estimate the potential for further demand reduction. (Note if this is not addressed in the Water Supply Assessment Study, a desktop study will be completed by ENGINEER).

2.3.1.4 *A description of Lunenburg's permit conditions under the Water Management Act as compared to the future water demands*;

2.4 Current Wastewater Management System and Determination of Wastewater Needs

2.4.1 Description of the Town's Wastewater system [desktop study]

2.4.1.1 Description of the Town's wastewater facilities including the existing collection system, as described in previous studies and upgraded as necessary.

2.4.1.2 Determine if any currently operational private package wastewater treatment facilities, that exist in or near Lunenburg, have additional capacity.

2.4.1.3 Describe Town's current agreements with existing facilities receiving septage pumped from Lunenburg's septic systems.

2.4.1.4 Research the current permit conditions of, physical conditions of, and plans to upgrade or modify existing wastewater treatment facilities in Fitchburg and Leominster.

2.4.1.5 Meet with the Board of Health to collect available relevant information and discuss the current situation of the Town's onsite subsurface wastewater disposal systems. Describe the Board of Health septic system regulations and procedures. Septage disposal, pumping records, new system installation, and repair procedures will all be explained.

2.4.2 Division of the Town into Study Areas.

2.4.2.1 Create distinctive Study Areas for which needs can be assessed and solutions analyzed. To maintain consistency with the 2001 CWMP, Study Areas will be "synced" with the 2001 CWMP Study Area delineations and existing neighborhood schemes, such as the Baker Station, Lower Massachusetts Avenue and Whalom areas. Areas outside of the original six "needs" areas previously defined will be delineated and included in the town-wide CWMP. The size of the individual Study Areas should be small enough so that customized solutions may be developed. Should significantly different natural conditions be found within existing neighborhoods, Areas may be subdivided to reflect specific characteristics. We will consider and make other revisions to the Study Areas as necessary for this CWMP. Study Areas should also include open land that has been targeted for development in the Master Plan.

2.4.3 Summarize existing conditions and problems for each Study Area.

2.4.3.1 Streamline the "Needs Survey" for the project and build from the previous studies. Categorize the Study Area "needs" into broad groupings. Examples of these groupings are; Public Health; Water Supply Protection; Protection of Surface Waters (from nutrient enrichment for example); enabling smart growth/other desired/required development (Chapter 40B or 40R projects for example); and Preserving Community Character. We will short list the Study Areas down to a strategic and manageable number so that the analysis can be focused and cost-effective. We will review water quality data collected in previous studies and updated as appropriate (specifically looking for area near bacteria impacted ponds or receiving waters), query the available GIS system information (specifically looking for areas with high unit water use) and review BOH variances collected in previous studies and updated as appropriate. We will then summarize the focused needs areas into groupings that will range from the favorable scenario of the area being capable handling current and expanded use with onsite systems to the least favorable scenario of the areas simply not being adequate for onsite disposal (offsite solution or tight tanking required).

This final grouping will establish a baseline for the Areas to be considered in CWMP Phase II.

2.4.3.2 Needs assessment will be Town-wide and build from previous studies. Early focus will be given to known "needs areas" as defined and refined by the Town as part of previous studies. These areas are assumed to be; 1) Baker Station; 2) Lower Massachusetts Avenue: and 3) specific Whalom areas. These areas will be reviewed and updated as appropriate to "align" them within the same overall town-wide "needs assessment" approach.

2.4.3.3 Perform brief visual survey to determine overall characteristics of each Area. Survey will: identify natural characteristics surrounding the Area, such as the presence of woodlands, water bodies, floodplain or wetlands; comment on the development characteristics of the neighborhood such as density of development, note the presence or absence of trees or ledge outcroppings; describe the overall topography of the Area, including the severity and direction of street grades, and if houses are significantly higher or lower than street elevations; identify signs of failed on-site systems; identify, characterize and list by street address any commercial properties. This survey will be "drive-by with appropriate stops" in nature, as opposed to a lot by lot review.

2.4.3.4 Compile recent Board of Health records for the Areas, including: septage pumping records; sites that have failed Title 5 inspections; sites that have been issued system repair or replacement permits; properties that have applied for financial assistance for system repairs. Locate system problems on base map.

2.4.3.5 Identify current lot sizes and zoning regulations within each Area. Consult assessor's maps and zoning regulations, and discuss known variances from the regulations with the Board of Health and Planning Board. It is assumed that the Assessors information necessary for these tasks will be available via electronically from the Town.

2.4.3.6 Identify the potential for subdivision of land and further development within each Area. Review the Town's Master Plan and zoning regulations, and consult with the Planning Board. Identify and evaluate planned and potential Chapter 40B and 40R housing projects in Lunenburg. Indicate these potential developments on base map.

2.4.3.7 Identify the development potential of land adjacent to each Area. Review the Town's Master Plan and zoning regulations, and consult with the Planning Board. Indicate potential development on base map.

2.4.3.8 Combine information on current zoning and planned growth to estimate current and future wastewater flows from each Area. Build a flow calculation spreadsheet based on the assessor's database. Spreadsheet to include information necessary to summarize current flow and projected future flow estimates. It is assumed that the Assessors information necessary for these tasks will be available electronically from the Town.

2.4.3.9 Perform a soils evaluation to determine the characteristics of soils in each Area. The program will be pointed at assessing the feasibility of using on-site systems or groundwater discharge systems. This evaluation will consist of a review of previous studies along with available BOH records; field investigations are not included within this Scope.

2.4.3.10 Compile and analyze existing groundwater quality data as provided by previous studies and the Town. Current BOH groundwater quality data will be collected and evaluated.

2.4.4 Rank areas by need for wastewater management.

2.4.4.1 Apply a rating formula to each Area (including undeveloped lands,) and present the rating criteria and Area conditions in a decision matrix to illustrate how each Area's rating was determined.

2.4.4.2 Rank the Areas according to their respective wastewater needs as determined by the calculated rating.

2.4.4.3 Present Study Area rating information on base map.

2.4.5 Based on high rankings, recommend areas that require solutions and therefore further investigation in the CWMP.

2.4.6 Assess the suitability of continued reliance on septic systems for Areas that received low rankings, and determine if those Areas should be further studied in the CWMP.

2.4.7 Review and evaluate water balance. The water balance should distinguish between groundwater reservoirs and surface water reservoirs. Groundwater sources and losses including: storm water infiltration, on-site disposal systems, and well withdrawals. Surface water sources include: stormwater runoff, WWTF discharges (of water withdrawn from groundwater sources,) inter-basin transfers of water and wastewater. The structure should allow for modification so that alternatives explored in CWMP Phase III may be evaluated. Previous water balance efforts will form the basis of this evaluation. *Efforts will be made to employ the water balance evaluation techniques used in the Nashua River Watershed Association's March 2002 Hydrologic Assessment.* [desktop study]

2.4.8 *Evaluate alternatives for legal and/or zoning regulations which control the number of tie-ins to existing and future sewers.*

2.4.9 *Evaluate the Town's current Sewer Regulations and recommend revisions (if necessary) to provide minimum design criteria for private sewer connections in anticipation of the transfer of authority for such issues from DEP to the local level.*

2.5 Prepare CWMP Phase I Report/Submittal

2.5.1 Compile the conclusions of Chapters 1 through 3, and produce the CWMP Phase I submittal.

2.6 Facilitate the CWMP Phase I public review process

2.6.1 Distribute the CWMP Phase I submittal to all applicable stakeholders.

2.6.2 Prepare materials, including summary sheets, maps and graphics, for a public meeting.

2.6.3 Attend a public meeting.

2.6.4 Compile a Public Comments Summary of comments received from stakeholders during the public review process. (Assume one round of review comments.)

2.7 Revise CWMP Phase I report for inclusion in Draft CWMP.

Task No. 3

3 PHASE II – MANAGEMENT TECHNIQUES AND ALTERNATIVES IDENTIFICATION AND SCREENING

3.1 Determination of Potential Site Locations for Satellite Treatment Facilities

3.1.1 Review previously developed siting criteria and update as appropriate.

3.1.2 Compile a list of Potential Sites for construction of satellite wastewater treatment facilities and groundwater discharge points.

3.1.2.1 Using assessor's information, identify undeveloped parcels with sufficient acreage, proximity to need areas, and distance from environmentally sensitive areas to develop a list of Potential Sites.

3.1.2.2 Perform a visual inspection of each Site to describe topography and ground cover.

3.1.2.3 Perform a literature search to determine the general soils and groundwater conditions of each Site.

3.1.2.4 Using the selection criteria and information in the above tasks, screen the identified sites to form a short list of Potential Sites.

3.1.2.5 Perform a desktop hydrogeologic evaluation of identified potential Sites to determine the feasibility of constructing a treated effluent disposal system on those sites.

3.1.2.6 Rank the Potential Sites according to the desktop hydrogeologic evaluation and the evaluation criteria.

3.1.2.7 Update the base map to reflect the locations of the Potential Sites.

3.1.3 Prepare a technical memorandum describing the selection criteria and the list of Potential Sites. Distribute to the PAC for review, and incorporate any suggested revisions into Chapter 1 of the CWMP Phase II submittal.

3.2 Overview of Wastewater Management Techniques and Technologies

3.2.1 Review technical, operational and permitting considerations of potential <u>on-site solutions</u> as appropriate

3.2.1.1 Technical considerations.

3.2.1.1.1 Identify ideal, adequate and prohibitive soil types.

3.2.1.1.2 Identify preferred and prohibitive groundwater separations as set forth in applicable regulations.

3.2.1.1.3 Identify spatial constraints such as lot size, proximate to property lines, proximity to wells, etc.

3.2.1.1.4 Identify other facilities, such as septic tanks, leaching fields or electricity that must be present for any proposed technology to work or be feasible and approved.

3.2.1.1.5 Describe any other conditions that are required for a proposed system to work, and any other conditions that prohibit the system's use.

3.2.1.1.6 Develop generic preliminary capital and operations and maintenance cost estimates.

3.2.1.2 Operational considerations

3.2.1.2.1 Describe the maintenance required to sustain a proposed system's operation.

3.2.1.2.2 Describe conditions that may cause the system to operate ineffectively.

3.2.1.2.3 Identify the residuals produced by the process.

3.2.1.2.4 Identify the residuals/septage disposal requirements.

3.2.1.3 Describe the overall advantages and disadvantages of potential on-site systems with regard to the:

3.2.1.3.1 disposal of wastewater;

3.2.1.3.2 continued limitations on growth;

3.2.1.3.3 capital and O & M costs;

3.2.1.3.4 pollution potential from failing or improperly maintained systems;

3.2.1.3.5 odors;

3.2.1.3.6 reliability;

3.2.1.3.7 redundancy;

3.2.1.3.8 phasing considerations;

3.2.1.3.9 environmental impacts.

3.2.1.4 Group the technologies into similar categories, and assess the general permitting and regulatory requirements for the on-site systems, such as:

3.2.1.4.1 Board of Health approval;

3.2.1.4.2 DEP approval for some I/A technologies;

3.2.1.4.3 Other applicable permitting and regulatory requirements.

3.2.2 Review technical, operational and permitting considerations of potential satellite solutions as appropriate.

3.2.2.1 Technical considerations.

3.2.2.1.1 Describe the wastewater loading rates and characteristics that are well suited and poorly suited for the technology.

3.2.2.1.2 Describe site conditions, including climate, soils, and groundwater elevation, that promote efficient treatment.

3.2.2.1.3 Describe the conditions that hinder operations.

3.2.2.1.4 Identify other treatment trains that must be paired with the technology to gain regulatory approval or adequate effluent quality.

3.2.2.1.5 Estimate the required land area for a sub-regional facility.

3.2.2.1.6 Develop generic, preliminary cost estimates for capital and operations and maintenance costs.

3.2.2.2 Operational considerations

3.2.2.2.1 Describe the staffing and training requirements to operate the facility.

3.2.2.2.2 Identify the materials/chemicals required to operate the system.

3.2.2.2.3 Identify the residuals produced by the process, and the requirements for residuals disposal.

3.2.2.2.4 Describe required maintenance schedules and procedures.

3.2.2.3 Describe the overall advantages and disadvantages of the potential satellite solutions with regard to:

3.2.2.3.1 the non-centralized disposal of wastewater;

3.2.2.3.2 the limitation of growth;

3.2.2.3.3 locating treatment facilities;

3.2.2.3.4 additional odor control;

3.2.2.3.5 the technology's reliability;

3.2.2.3.6 the technology's performance;

3.2.2.3.7 any significant environmental impacts such as odors;

3.2.2.3.8 potentially higher capital and operations costs.

3.2.2.4 Assess the general permitting/regulatory requirements of each potential satellite solution, including:

3.2.2.4.1 Possible Board of Health approval;

3.2.2.4.2 Possible Conservation Commission approval;

3.2.2.4.3 Possible Army Corps of Engineers 404 permit;

3.2.2.4.4 Possible DEP 401 Water Quality Certification;

3.2.2.4.5 DEP groundwater discharge permits;

3.2.2.4.6 DEP approval for some I/A technologies;

3.2.2.4.7 Other applicable permitting and regulatory requirements.

3.2.3 Description of centralized/regional wastewater solutions.

3.2.3.1 Review options available to provide wastewater treatment capacity at area treatment facilities while avoiding interbasin transfer of wastewater, as appropriate. Evaluate sub-basin impacts for alternatives as well.

3.2.3.2 Review previously described technical considerations associated with the different wastewater collection system alternatives available**,** and update as appropriate:

3.2.3.2.1 Gravity sewers;

3.2.3.2.2 Low pressure sewers;

3.2.3.2.3 Pump stations and force mains;

3.2.3.2.4 Vacuum sewers;

3.2.3.2.5 Small diameter gravity sewers;

3.2.3.2.6 STEP systems.

3.2.3.3 Describe the operational considerations associated with the different wastewater collection system components, such as:

3.2.3.3.1 Odor control;

3.2.3.3.2 lower O&M on gravity;

3.2.3.3.3 higher O&M on low pressure and pump stations.

3.2.3.4 Describe the overall advantages and disadvantages of a centralized/regional wastewater solution, including:

3.2.3.4.1 Management/control of facilities;

3.2.3.4.2 Capital and O&M costs;

3.2.3.4.3 WWTF effluent monitoring and control;

3.2.3.4.4 transporting water downstream to treatment facilities;

3.2.3.4.5 possible interbasin transfer;

3.2.3.4.6 promotion of growth.

3.2.3.5 Describe the overall general permit/regulatory requirements for the construction of wastewater collection systems, including:

3.2.3.5.1 possible Conservation Commission approval;

3.2.3.5.2 DEP sewer extension permit;

3.2.3.5.3 Possible interbasin transfer;

3.2.3.5.4 Easements and property takings.

3.2.4 Review previously detailed watershed-based (non-wastewater) management techniques and update as appropriate.

3.2.4.1 Review regional conservation initiatives, and briefly describe conservation issues.

3.2.5 Prepare a technical memorandum summarizing the information generated in Task 3.2. on potential technologies. To the maximum extent possible, present the information in a format that facilitates the evaluation of the technologies using the general screening criteria. This technical memorandum, with any revisions, will become Chapter 2 of the CWMP Phase II submittal.

3.3 Screening of the Potential Techniques/Technologies

3.3.1 Create a technology evaluation form based on the screening criteria.

3.3.2 Complete a technology evaluation form for each potential technology.

3.3.3 Generate a decision matrix summarizing the information on the technology evaluation forms. The matrix will consist of criteria on one axis, technologies on the other, and numerical ratings in the array.

3.3.4 Prepare a technical memorandum summarizing the screening process and recommending candidate technologies for further examination in Phase III. This technical memorandum, with any revisions, will become Chapter 3 of the CWMP Phase II submittal.

3.4 Facilitate the CWMP Phase II public review process

3.4.1 Distribute the Phase II submittal to all applicable stakeholders. Assume 20 copies will be distributed.

3.4.2 Prepare materials, including summary sheets, maps and graphics, for a public meeting.

3.4.3 Attend a public meeting.

3.4.4 Compile a Public Comments Summary of comments received from the stakeholders during the pubic review process. Assume one round of review comments.

3.5 Revise CWMP Phase II report for inclusion in Draft CWMP.

Tasks 4 and 5 are included to detail the complete Scope of Services for this project. They are not authorized for work by the ENGINEER as part of this AGREEMENT. ENGINEER shall only commence work on these tasks when authorized in writing by the CLIENT and an Amendment to this AGREEMENT is executed by the ENGINEER and CLIENT.

Task No. 4

4 PHASE III – DETAILED EVALUATION OF ALTERNATIVES AND RECOMMENDATION OF WASTEWATER MANAGEMENT PLAN

4.1 Pair candidate technologies with needs Areas to create Viable Alternatives.

4.1.1 Describe conditions present in each Area, including a summary of conditions described in Section II of CWMP Phase I, and projected wastewater flow.

4.1.2 For each Area: Identify on-site techniques that are not feasible because area conditions (e.g. soils, lot size, and groundwater) are prohibitive for the technology. Identify on-site technologies that are not preferred because area conditions are not ideal for the technology. Identify on-site technologies that are technically feasible because area conditions align with conditions that are conducive for implementation of the technology. Create a short-list of viable on-site technologies for each Area.

4.1.3 Pair study Areas with nearby Potential Sites for decentralized treatment facilities and describe the collection/conveyance system from the Area to the Site.

4.1.4 Describe the conditions present at each potential Site and create a short-list of viable satellite technologies for each.

4.1.5 Describe the viable centralized/regional options, including paired techniques to increase treatment capacity at Fitchburg and Leominster facilities.

4.1.6 Compile the Viable Alternatives into solutions for each Area and combination of Areas and potential Sites.

4.2 Prepare general conceptual designs of each Viable Option. [Note – the level of effort for this task depends on the number of Areas and the number of candidate technologies under consideration.] In the case of on-site solutions, conceptual designs will consist of selecting representative lots and representing the I/A technology on those lots. For satellite solutions, a collection system schematic in the Area and a preliminary facility layout on the Site will be developed. For the centralized solutions, a schematic wastewater collection system layout indicating the destination of the wastewater will be completed.

4.2.1 For each Viable Alternative, identify the associated general environmental impacts:

4.2.1.1 water quality and quantity including the amount of groundwater recharge vs. surface water discharge associated with the option;

4.2.1.2 solid/hazardous waste generation (including Septage or residuals disposal);

4.2.1.3 odors, air and noise;

4.2.1.4 visual, historical, open space and recreation impacts;

4.2.1.5 wetlands, habitat and flood plain impacts;

4.2.1.6 growth and development consideration;

4.2.1.7 aesthetic compatibility of the system with the surrounding environment.

4.2.2 For each Viable Alternative, prepare a preliminary *present worth cost analysis* for construction and operation of systems in each Area or Site.

4.2.2.1 Establish budgetary costs for components of potential wastewater management systems.

4.2.2.2 Estimate quantities of each component for each viable technology in each Area or potential Site.

4.2.2.3 Calculate a budgetary capital cost of each viable option for each Area or potential Site, including ancillary costs to develop the solution.

4.2.2.4 Estimate the operation and maintenance cost of each viable alternative for each Area, including any unique costs such as long-term monitoring of I/A technologies.

4.2.3 Compile the conceptual designs into packages for each Area and combinations of Areas and Sites. Solutions will include schematic layouts, evaluation matrices for environmental impacts, and a present worth calculation to estimate the option's preliminary costs.

4.3 Apply the selection methodology to each of the Viable Alternative conceptual designs

4.3.1 Create a Viable Alternative evaluation form based on the selection methodology set forth. The impetus behind the form and format of the form are similar to the one developed for the technology screening process.

4.3.2 Complete an evaluation form for each Viable Alternative.

4.3.3 Generate a decision matrix summarizing the information on the evaluation forms. The matrix will consist of criteria on one axis, alternatives on the other, and numerical ratings in the array.

4.3.4 Prepare a technical memorandum summarizing the selection process and recommending a preferred technology for each Area or combination of Areas and Sites. This technical memorandum, with any revisions, will become a chapter of the CWMP Phase III submittal.

4.4 Final Wastewater Management Plan Refinement

4.4.1 Complete a conceptual summary of the recommended wastewater management systems which may include regional, on-site, satellite and centralized/regional solutions and water conservation techniques.

4.4.1.1 Prepare schematic preliminary design maps specifying wastewater collection system routes and types, and indicating the destination of wastewater.

4.4.1.2 Locate proposed pump stations and indicate the present and future design flows.

4.4.1.3 If applicable, provide a general summary of satellite treatment facilities to accommodate current and future flows.

4.4.1.4 Identify potentially impacted wetlands and estimate any required replication.

4.4.1.5 Specify conditions of inter-municipal agreements necessary with the Town of Leominster and City of Fitchburg.

4.4.1.6 Outline water conservation programs.

4.4.2 Identify and generally summarize the environmental impact of the preferred alternative.

4.4.2.1 Assess the aesthetics impacts of satellite facilities.

4.4.2.2 Assess the alternative impacts to groundwater quality, particularly in any Zone II's.

4.4.2.3 Estimate the impacts to water quality in receiving water bodies.

4.4.2.4 Estimate the quantities of residuals produced by the treatment facilities and indicate the potential disposal methods.

4.4.2.5 Indicate the potential for odor generation or air pollution.

4.4.2.6 Provide a general assessment of the net interbasin transfer resulting from the plan.

4.4.2.7 Assess the reduced risk to human health by discontinuing use of septic systems for areas that this was determined to be the best solution.

4.4.2.8 Identify any general impacts to wetlands or species habitat and indicate any mitigation measures (no wetlands delineation is included in the Scope of Services)

4.4.2.9 Estimate average power consumption by the operation of the proposed facilities.

4.4.2.10 Indicate the character and quantities of any material and chemicals required to operate the facilities.

4.4.2.11 Assess how the proposed alternatives might impact projected growth patterns.

4.4.2.12 Assess the impacts of reduced recharge on both public and private drinking water supplies (based on available information) [desktop study].

4.4.2.13 *Prepare a complete flow table for both the existing and proposed sewers for each proposed alternative.*

4.4.3 Identify the regulatory considerations and permit requirements of the preferred alternatives.

4.4.4 Prepare a planning level *present worth* cost analysis for the management plan, including both capital and O & M costs.

4.5 Compile the separate, selected components of the overall plan into a single unified Recommended Management Plan.

4.5.1 Combine the selected preliminary solutions into a single recommended plan.

4.5.2 Assess the cumulative environmental impact of the recommended plan.

4.5.3 Develop a final cost estimate for the recommended plan.

4.5.4 *Assess the "cost per household" of the recommended plan by comparing the final cost estimate to the number of households served by the recommended plan.*

4.6 Develop an Implementation Plan

4.6.1 Prepare a brief project implementation plan.

4.6.2 Review existing intermunicipal agreements with Fitchburg and Leominster and any other applicable public or private WWTFs.

4.6.3 Identify a plan for financing the project including the possible sources of funding, and repayment options.

4.6.4 Outline a proposed project schedule, including sequencing of construction contracts, permits, and project compliance.

4.7 Compile all of the CWMP Phase III efforts, as modified by the Meetings, into a unified CWMP Phase III submittal. This submittal will be the Draft version of the Comprehensive Wastewater Management Plan.

4.7.1 Facilitate the CWMP Phase III public review process

4.7.2 Distribute the CWMP Phase III submittal to all applicable stakeholders. Assume 20 copies will be distributed.

4.7.3 Prepare materials, including summary sheets, maps and graphics, for a Public Hearing.

4.7.4 Attend a public hearing.

4.7.5 Compile a Public Comments Summary of comments received from the stakeholders during the public review process.

4.8 Revise CWMP Phase III report for inclusion in Draft CWMP

4.9 *Hydrogeological Assessment of Potential Groundwater Discharge Sites [TASK 4.4 is NOT INCLUDED in this AGREEMENT. Task items are listed for information only. If a hydrogeological assessment is determined to be necessary, an amendment to the contract fee will be negotiated at that time.]*

4.9.1 *Negotiate and administer subcontract with drilling subcontractor.*
4.9.2 *Install test borings in the area of the potential groundwater discharge site. Convert test borings to monitoring wells after soils assessment.*
4.9.3 *Produce boring and well construction logs.*
4.9.4 *Assess site vertical hydraulic conductivity through double ring infiltrometer testing.*
4.9.5 *Develop base map of each site showing borings, test pit and monitoring well locations.*
4.9.6 *Perform preliminary predictive mounding analyses on the potential groundwater discharge areas for the assumed effluent loading rates.*
4.9.7 *Perform estimated hydraulic conductivity measurements on the monitoring wells.*

4.9.8 *If preliminary analysis indicates viability for groundwater discharge, install 2.5-inch diameter test wells with stainless steel screens and perform a short duration (3 - 4 hour) pumping test. Test data will provide aquifer hydraulic coefficients.*

4.9.9 *Evaluate results for groundwater discharge feasibility for each site.*

Task No. 5

5 PHASE IV – DRAFT AND FINAL CWMP PREPARATION

5.1 Draft CWMP

The final phase of planning will integrate the previous three submittals into a unified Draft CWMP. Upon the completion of each phase, Wright-Pierce in conjunction with the Town, DEP and the PAC will agree upon which comments received during the public review process to address, and how to best address them. The responses to these comments will be incorporated into the Phase IV submittal. The content of the report will be revised to reflect comments from regulatory agencies and the public. An executive summary including the conclusions and recommendations will be added to the report.

5.2 Prior to the CWMP Phase IV submittal, up to two meetings will be held with the reviewing agencies and Town officials. The purpose of these meetings will be to ensure the completeness of the Draft CWMP and thereby minimize the number of issues to address during the public review period. WP will produce and distribute 20 copies of the Draft CWMP to the stakeholders for review.

5.3 Final CWMP

The input resulting from the Draft CWMP will be incorporated into the Final CWMP for approval by DEP and ratification by the Town. It is assumed that 20 final copies will be provided for final distribution.

APPENDIX E
Bibliography

APPENDIX E

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APPENDIX F
Existing Collections Systems

APPENDIX F

EXISITNG SEWER SYSTEM

LUNENBURG, MASSACHUSETTS

Sewers	Total Length (ft)	Total Length
Phase 1	71,057	13.46
Contract 1	19,250	3.65
8" pipe	9,623	1.82
10" pipe	258	0.05
18" pipe	9,369	1.77
Contract 2	45,340	8.59
8" pipe	36,628	6.94
12" pipe	1,994	0.38
18" pipe	5,405	1.02
Electric Ave	6,467	1.22
Existing	13,210	2.41
System Total	84,267	15.38

Force Main	Size & Type	Approx Length (ft)
Dana St (Whalom Rd) PS	10" DI	1200
Leominster Rd PS	10" DI	4025
West St PS	2" HDPE	575
Francis St PS	2" HDPE	760
Mass Ave PS #1	8" DI	6985
Mass Ave PS #2	4" HDPE	1175
Mass Ave PS #3	3" HDPE	1500
Twin City (200) PS	3" HDPE	950
Electric Ave (100) PS	3" HDPE	600
Stone Farm Adult Community	2" SDR21	1130
	3" SDR21	1350
	Total (mi):	3.84

APPENDIX G
Groundwater Discharge Permit - Woodland Facility

DISCHARGE PERMIT

Name and Address of Applicant: The Woodlands Village at Hickory Hills Lake Condominium Association c/o Hodan Management Ltd.
P.O. Box 8397
Boston, MA 02114

Date of Application: April 8, 2002

Application/Permit No. 2-362M

Date of Issuance: July 11, 2002

Date of Expiration: July 11, 2007

Effective Date: July 11, 2002

AUTHORITY FOR ISSUANCE

Pursuant to authority granted by Chapter 21, Sections 26-53 of the Massachusetts General Laws, as amended, the following permit hereby issued to: The Woodlands Village at Hickory Hills Lake Condominium Association (hereinafter called "the permittee") authorizing discharges to the ground from an on-site RUCK wastewater treatment system, at the Woodlands at Royal Fern Drive in Lunenburg, Massachusetts such authorization being expressly conditional on compliance by the permittee with all terms and conditions of the permit hereinafter set forth.

Robert A. Kimball

Robert A. Kimball, P.E.
Environmental Engineer V
Bureau of Resource Protection

7/11/02

Date

I. SPECIAL CONDITIONS

A. Effluent Limits

The permittee is authorized to discharge into the ground from the wastewater treatment facilities for which this permit is issued a treated effluent whose characteristics shall not exceed the following values:

Effluent Characteristics	Discharge Limitations
Flow	12,500 gallons per day
BOD, 5 day, 20°C	30.0 mg/l
Total Suspended Solids	30.0 mg/l
Oil & Grease	15.0 mg/l
Nitrate-Nitrogen	10.0 mg/l
Total Nitrogen	10.0 mg/l
Phosphorus (Total and Dissolved)	5.0 mg/l

a. The pH of the effluent shall not be less than 6.5 nor greater than 8.5 at any time.

b. The discharge of the effluent shall not result in any demonstrable adverse effect on the groundwater or violate any water quality standards that have been promulgated.

c. The monthly average concentration of BOD and total suspended solids in the discharge shall not exceed 15 percent of the monthly average concentrations of BOD and total suspended solids in the influent into the permittee's wastewater treatment facilities.

d. When the effluent discharged for a period of 90 consecutive days exceeds 80 percent of the permitted flow limitations, the permittee shall submit to the permitting authorities projected loadings and a program for maintaining satisfactory treatment levels consistent with approved water quality management plans.

APPENDIX H
Ground Water Discharge Permit - Flat Hill Facility

DISCHARGE PERMIT

Name and Address of Applicant: Robert Hicks, 124 Main Street, Westford, MA

Date of Application: July 12, 2001

Application No./Permit No. W021968/ 733-0

Date of Issuance: November 8, 2002

Date of Expiration: November 8, 2007

Effective Date: November 8, 2002

AUTHORITY FOR ISSUANCE

Pursuant to authority granted by Chapter 21, Sections 26-53 of the Massachusetts General Laws, as amended, the following permit hereby issued to: Robert Hicks, Inc. of 124 Main Street, Westford, MA (hereinafter called "the permittee") authorizing discharges from the onsite Wastewater Treatment Facility that serves the residential subdivision known as "Village at Flat Hill" to the ground located at the property now or formally known as the Sweeney Property on Arbor Street, Lunenburg, MA such authorization being expressly conditional on compliance by the permittee with all terms and conditions of the permit herein after set forth. The wastewater treatment facility receives and treats wastewater generated from forty-five 3-bedroom residential condominiums or any combination of 2, 3, or 4 bedrooms units, provided that the total design flow of wastewater does not exceed 14,850 gallons per day.

Robert A. Kimball

Robert A. Kimball, P.E.
Environmental Engineer V
Bureau of Resource Protection

Nov. 8, 2002

Date

I. SPECIAL CONDITIONS

A. Effluent Limits

The permittee is authorized to discharge into the ground from the wastewater treatment facilities for which this permit is issued a treated effluent whose characteristics, within one month after start-up of the facilities and continuing thereafter, shall not exceed the following values:

Effluent Characteristics	Discharge Limitations
Flow, gallons per day	14,850 gpd
BOD, 5-day @ 20 °C	30.0 mg/l
Total Suspended Solids	30.0 mg/l
Oil and Grease	15.0 mg/l
Nitrate-Nitrogen	10 mg/l
Total Nitrogen ($TKN+NO_3+NO_2$)	10 mg/l

a) The pH of the effluent shall not be less than 6.5 nor greater than 8.5 at any time.

b) The discharge of the effluent shall not result in any demonstrable adverse effect on the ground water or violate any water quality standards that have been promulgated.

c) The monthly average concentration of BOD and total suspended solids in the discharge shall not exceed 15 percent of the monthly average concentrations of BOD and total suspended solids in the influent into the permittee's wastewater treatment facilities.

d) When the effluent discharged for a period of 90 consecutive days exceeds 80 percent of the permitted flow limitations, the permittee shall submit to the permitting authorities projected loadings and a program for maintaining satisfactory treatment levels consistent with approved water quality management plans.

APPENDIX I
Intermunicipal Agreement - Fitchburg

INTERMUNICIPAL AGREEMENT

FOR

WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

BETWEEN

CITY OF LEOMINSTER, MASSACHUSETTS

AND

TOWN OF LUNENBURG, MASSACHUSETTS

Preamble

THIS AGREEMENT made and entered into this _____ day of ______ , 1999, and executed in quadruplicate (each executed copy constituting an original) between the City of Leominster (hereinafter "Leominster") and the Town of Lunenburg (hereinafter "Lunenburg").

WITNESSETH :

WHEREAS, the City of Leominster owns and operates a wastewater treatment system; and

WHEREAS, Lunenburg intends to construct a sewer system in Lunenburg to the Lunenburg Leominster line where it will connect with the Leominster sewer system; and

WHEREAS, Leominster, in and under the terms and conditions as listed herein, desires to sell sewage disposal capacity to Lunenburg; and

WHEREAS, Lunenburg, in and under the terms and conditions as listed herein, desires to purchase sewage disposal capacity from Leominster; and

WHEREAS the parties recognize that Leominster must implement and enforce a pretreatment program to control discharges from certain users of its wastewater treatment system under the Clean Water Act, 42 U.S.C. § 1251 et seq. and requirements set forth at 40 CFR Part 403; and

WHEREAS, the parties are authorized by Chapter 40, Section 4 and 4A of the General Laws to enter into an Intermunicipal Agreement for the purpose of the City of Leominster supplying sewage disposal to the Town of Lunenburg, subject to authorization by the Leominster City Council and the Lunenburg Town Meeting; and

WHEREAS, at present there are no existing facilities in Lunenburg to be served by the proposed sewer system which will discharge industrial waste to the Leominster system; and

NOW THEREFORE, in consideration of the mutual covenants and agreements hereinafter contained, the parties agree as follows:

1. <u>Term/Purpose/Intent</u>

1.1 The term of this Agreement shall be for a period of twenty-five (25) years from date hereof, unless sooner terminated as herein provided. The parties intend that the municipal corporations entering into this Agreement are the sole and exclusive beneficiaries of the Agreement. Subject to the terms and limits of this Agreement and of applicable state and federal law, the City of Leominster acting through its Department of Public Works will provide sewer service to the Town of Lunenburg in consideration for payment of applicable sewer use rates and fees.

1.2 This Agreement shall not take effect until it has been authorized by the Leominster City Council and the Lunenburg Town Meeting.

1.3 Leominster shall use its best efforts to be at all times in compliance with the NDPDES permit issued for the facility and to comply with all state and federal laws, regulations, water quality standards, orders, decrees of any state and/or federal governmental authority having jurisdiction over the treatment and disposal of waste waters.

1.4 Characteristics of waste delivered to the facility by or from Lunenburg shall at all times conform to standards set by Rules and Regulations of the U.S. Environmental Protection Agency (hereinafter called "EPA") and the MA DEP and Leominster's Sewer Use Ordinance, all as issued and amended from time to time.

2. <u>Amendments</u>

2.1 No officer, official, agent, or employee of Leominster or Lunenburg shall have the power to amend, modify or alter this Agreement or waive any of its provisions or to bind Leominster or Lunenburg by making any promise or representation not contained herein except by an amendment, in writing, executed by both municipal corporations in the same manner as this Agreement is executed. Neither party may rely on any conduct, statements, action, inaction or course of conduct of the employees, agents or officers of the other party as having changed, modified or amended this Agreement. Neither party shall be construed as waiving any provision of the Agreement unless the waiver is executed in writing as an amendment to this Agreement. No waiver by either party of any default of breach shall constitute a waiver of any subsequent default or breach. Forbearance or indulgence in any form or manner by either party shall not be construed as waiver of any term or condition hereto nor shall it limit the legal or equitable remedies available to that party.

3. Assignment

3.1 This Agreement shall not be assigned or transferred by either party, without the express written consent of the other party given with the same formalities as are required for the execution of this Agreement.

4. Hold Harmless/Indemnification

4. 1 To the extent permitted by law, Lunenburg hereby agrees to indemnify and save harmless Leominster or its agents against any and all liability or claims arising from the acts or omissions of Lunenburg or its agents or employees relating to Lunenburg's performance under this Agreement, including but not limited to liability deriving from state and federal environmental administrative findings or orders or actions or claims for damages on account of injury to person, or property or the environment caused by any act or omission of Lunenburg, it agents or employees or any fine, penalties or monetary awards which arise out of Lunenburg's acts or omissions under the terms of this Agreement.

5. Force Majeure

5.1 No failure or delay in performance shall be deemed to be a breach of this Agreement when such failure or delay is occasioned by or due to any Act of God, strike, lockout, war, riot, epidemic, explosion, sabotage, breakage or accident to machinery or lines or pipe, the binding order of any court or governmental authority, or any other cause whether of the kind herein enumerated or otherwise not within the control of the party against whom a breach is alleged.

6. Reports/Records/Rate Schedules

6.1 Annually, during the first week of February, Lunenburg and Leominster shall mutually exchange records pertinent to the flows from each municipality. The records shall include the average daily flow for each month. The annual flow data will be reconciled against the allocated treatment capacity for the Town and the City. The Town and the City will also furnish data on the expected flows for the upcoming year, the amount of committed but unconnected capacity, and uncommitted capacity.

6.2 Upon Leominster's request, Lunenburg shall provide reports and records giving the names and addresses of all Lunenburg's customers and showing the location to which sewage is being accepted, character of occupancy, and amount of sewage produced on a monthly basis by each customer and any other reports, records or data reasonably required by Leominster.

6.3 Lunenburg shall furnish sewer system plans as Leominster may request from time to time.

6.4 Lunenburg shall notify Leominster in writing and keep Leominster informed of the name and title of its official or officials responsible for sewage services in Lunenburg and for implementation of the terms of this Agreement.

7. Inspections

7.1 Leominster has the right to inspect and test any equipment which Lunenburg is required to install and/or maintain under the Agreement. Leominster can require Lunenburg to repair and replace any such equipment if it is demonstrated not to perform. If Lunenburg fails to replace or repair any such item, within a reasonable time under the circumstances and as set forth in written notice to Lunenburg, Leominster may do so and bill Lunenburg for the cost thereof.

Payment shall be due within thirty days after Leominster mails or delivers a billing statement to Lunenburg.

7.2 Leominster has the right to inspect facilities and equipment in Lunenburg which may affect the sewage system. These inspections and any inspections permitted under this Agreement may include any and all reasonable tests Leominster deems necessary. Lunenburg hereby consents to Leominster's entry onto or into property of Lunenburg for the purpose of any inspection or repair, installation or maintenance which Leominster may require under this Agreement. Leominster will not, except as expressly set forth in this Agreement, perform any work in Lunenburg but will require work, as needed, to Leominster's specifications for all extensions of sewer lines.

8. Remedies

8.1 In addition to the remedies, power and authority which the Department of Public Works has under ordinances of the City of Leominster, the following remedies apply:

a) If either party fails to fulfill any obligation or condition of this Agreement, the other party has the right to terminate this Agreement by giving ninety (90) days notice, in writing, of its intent to do so. Upon receipt of such notice the party shall have the right to prevent termination by curing the default within sixty (60) days. Termination shall not release Lunenburg from its obligation to pay all bills or sums due in accordance with this Agreement.

b) Both parties reserve the right, either in law or equity, by suit, and complaint in the nature of mandamus, or other proceeding, to enforce or compel performance of any or all covenants herein.

c) Any bill remaining unpaid after the thirtieth day from the date of billing or the due dates as specified in this Agreement, whichever is later, shall bear interest at the rate of prime plus 2% annually computed from the end of the governing period.

d) If an administrative agency, board, commission or division of the state or federal government or any court impairs, alters, restricts or limits, directly or indirectly Leominster's rights, powers or authority to maintain, sell, contract for, or permit sewage disposal as described in this Agreement, Leominster in its sole discretion may terminate and void this Agreement by written notice to Lunenburg. Termination under this clause shall not release Lunenburg from its obligation to pay any sums due and all bills owed for services previously rendered unless to do so would be in violation of a final administrative or judicial decree, order or ruling. The notice of termination shall be given within five business days after Leominster receives written notice of the action or decision of such agency, board, commission, division or court. It is the intent of this notice provision to give Lunenburg as much advance notice as possible consistent with Leominster's need to terminate. Leominster will notify Lunenburg of the formal institution of any proceedings or the issuance of any formal order so that Lunenburg may, if it chooses, participate in such proceedings or challenge any such order.

e) If either party fails to perform any obligation under this Agreement, the other party may perform on behalf of the defaulting party and charge the reasonable costs thereof, including administrative time, to the defaulting party as a sum due under the Agreement provided written notice is given to the defaulting party allowing it a reasonable time to cure the default.

f) Leominster may in its sole discretion immediately stop providing service to Lunenburg: (1) if Lunenburg fails to cure any default within sixty (60) days after written notice as provided in paragraph 8.1(a); or (2) if Lunenburg or any consumer utilizing Lunenburg's access to Leominster's sewer system, by intent violates or fails to comply with any notice or order of the Commission permitted or required under EPA's pretreatment regulations or violates any requirement imposed by the EPA regulating wastewater discharge, treatment or pretreatment.

g) The remedies set forth in this Agreement are cumulative. The election of one does not preclude use of another.

9. Emergencies

9.1 Each party shall immediately notify the other of any emergency or condition in either party's system of which it learns may affect sewer disposal system in either municipality .

10. Meter Readings

10.1 Lunenburg shall install a meter at the City line at each point of connection, to measure and accumulate wastewater flow. The metering device shall be approved by Leominster prior to installation; such approval shall not be unreasonably withheld.

10.2 When Leominster determines that a sewer meter has registered incorrectly, the Commission shall prepare an estimate of the amount of sewage accepted through the faulty meter for the purposes of billing Lunenburg. Leominster shall present evidence to Lunenburg demonstrating that the meter is reading incorrectly, justifying its estimate of sewage flow for the billing period. The estimate shall be based upon the average of three (3) preceding readings of the meters, exclusive of incorrect readings. When less than three (3) correct readings are available, fewer readings, including some obtained after the period of incorrect registration, may be used.

10.3 In the initial period of meter operation, when connected flows total less than 15,000 gallons per day at any point of connection, Leominster shall permit Lunenburg to furnish water meter readings from connected customers for the purpose of determining daily flows.

11. Lunenburg/Leominster Employees

11.1 Employees, servants, or agents of either municipality shall not be deemed to be agents, servants or employees of the other municipality for any purpose including but not limited to either Workers' Compensation or unemployment insurance purposes.

12. Method of Supply

12.1 Lunenburg agrees to purchase sewage disposal services and capacity from Leominster in accordance with the terms and conditions of this Agreement. Lunenburg shall be entitled to discharge a total of 500,000 gallons per day of Normal Strength Wastewater into Leominster's sewer collection system at one or more metered location(s) at the City of Leominster line.

12.2 Leominster shall approve all connections by Lunenburg to the Leominster wastewater system. Lunenburg shall construct and maintain a flow measuring station at each approved connection, suitable to continuously measure and record all flows entering the Leominster sewer system. Leominster shall have the right of access to said metering stations for purposes of inspection and data acquisition. Leominster must approve the measuring system design before Lunenburg begins construction.

12.3 All sewerage (wastewater) flows expressed or referred to within this Agreement (unless otherwise noted) are monthly average flows, and are computed based upon the most recent calendar month total flow measured at the metered connection, divided by the number of days in the month.

13. Use Restriction

13.1 Lunenburg shall use the sewage capacity furnished under this Agreement solely for its municipal wastewater and for wastewater generated by persons subject to its or Leominster's jurisdictional control and within Lunenburg's corporate limits. Lunenburg shall not permit any sewage capacity furnished hereunder to be used by any person outside of Lunenburg's territorial limits without the express written consent of Leominster in each instance.

14. Reserved Capacity

14.1 Leominster agrees to permit Lunenburg to discharge flows up to 500,000 gallons per day through connections with the Leominster sewer system during the term of this Agreement.

15. Funding and Appropriations

15.1 Lunenburg agrees to appropriate annually sufficient money to pay for its obligations under this Agreement.

16. Connection Charge

16.1 Lunenburg shall pay Leominster a Connection Fee of $750 for each dwelling unit connected to Lunenburg's sewer discharging to Leominster; however all Lunenburg residential and commercial customers connected to the Leominster sewer system and directly billed by the City as of and prior to December 31, 1998 are exempted from this fee. This fee shall be paid to Leominster within ninety (90) days of the time of the connection of each dwelling to the Lunenburg Sewer. Multiple family dwellings shall pay an equivalent multiple of the connection fee times a factor of 70%. For example, a three family home shall pay (3 X \$750) X .70 = \$1,575. Accessory living apartments as defined under Lunenburg's By-laws shall not be considered as a separate dwelling.

16.2 Public buildings, schools, commercial buildings and industrial properties connecting to the sewer shall pay an amount computed as "Total Charges" in accordance with the following table. For the purpose of this computation, "Proposed discharge, gpd" shall be determined in accordance with 310 CMR 15.203 [Title 5 – System Sewage Flow Design Criteria] dated March 24, 1995.

Proposed Discharge, gpd	Rate	Total Charges
1000 – 2000	\$1.60/gpd	\$1,600 - \$3,200
2001 – 10,000	\$3,200 + \$0.80/gpd in excess of 2000 gpd	\$3,200 - \$9,600
10,001 – 50,000	\$9,600 + \$0.40/gpd in excess of 10,000 gpd	\$9,600 - \$25,600
> 50,000	Flat fee	\$31,400

17. <u>User Fee</u>

17.1 Lunenburg shall pay Leominster on a quarterly basis a user fee of \$1.75 per hundred cubic feet (ccf). Leominster may not increase this until the date that Lunenburg's sewage first flows through the initial point of entry to Leominster. Thereafter, Lunenburg's user fee shall not be increased unless Leominster's rate to its single family residential users is increased. The monetary increase to Lunenburg user fee shall not exceed the monetary increase in Leominster's rate to its single family residential users.

17.2 Leominster shall furnish sewer service to Lunenburg residents along the west side of Whalom Lake from a point beginning and including the property owned by Whalom Park to Wilder Street in Leominster. This service shall be provided with the existing city-owned sewer. Ordinary maintenance of the sewer serving these customers shall be the responsibility of the Town. Leominster shall be responsible for all capital improvements to this line for the duration of the initial term of this Agreement, including repairs related to infiltration/inflow remediation.

Leominster shall furnish the quarterly water meter readings for these customers and all other Leominster water customers in Lunenburg served by public sewers. Lunenburg shall bill these customers for both water and sewer service. Lunenburg will reimburse Leominster for all customer water bills according to the published Leominster water rate schedule for non-Leominster residents. Lunenburg will reimburse Leominster for the sewer service based upon other provisions of this Agreement including Articles 10. and 17. Water bill reimbursements will be due within 60 days of receipt of the water meter readings by Lunenburg from the City.

17.3 Leominster may surcharge Lunenburg for discharge of wastewater containing pollutant levels exceeding concentrations found in Normal Strength Wastewater in proportion to the actual strength to the maximum normal strength based upon BOD or suspended solids, at Leominster's option.

18. Infiltration/Inflow Correction

18.1 Lunenburg shall contribute to the construction of repairs to the sewers in Leominster for relieving Infiltration and Inflow in order to create capacity within the City Sewers to accept Lunenburg's flows. Prior to the connection and discharge of sewage from Lunenburg to Leominster (except for all Town residential or commercial connections existing as of December 31, 1998; and any subsequent connections which in the aggregate do not exceed 1,000 gallons per day), the Town shall apply for and recieve a loan from the Water Pollution Abatement Trust (SRF) in an amount not to exceed $300,000 for eligible work in Leominster, and direct the principal of said loan to that purpose. The City shall determine the use of such monies and shall assist the Town in applying for and receiving SRF funds. The Town shall be responsible for the amortization of the SRF loan. *This is a condition of this agreement, and the Town may not connect to the City sewer system until such SRF monies are obtained by the Town for the specific purpose of this article. However, any grant money procured by the Town from any source may be applied to this purpose in lieu of an SRF loan.*

19. Capital Improvement Provision

19.1 In the event that the Leominster Department of Public Works decides to repair or replace any item used at or in connection with its facilities and the cost of any single replaced or repaired item exceeds $200,000.00, or if Leominster is directed or ordered by EPA, DEP or any other Agency or Court of the state or federal government to provide a higher degree of treatment at the facility in the future, or otherwise to modify the process from that used or in place at the time of execution of this Agreement, the total cost of such replacement or additional facilities shall be apportioned between the parties as set forth in paragraph 19.2 of this Agreement.

19.2 Lunenburg shall pay to Leominster a portion of Leominster's annual debt service resulting from capital improvements to the Leominster Wastewater Treatment Plant which become necessary after the date at which flow first passes from Lunenburg to Leominster. Lunenburg's annual contribution to such debt service shall be computed as the flow ratio times the annual debt service cost. The flow ratio shall be the ratio of Lunenburg's annual sewage flow - measure at the connection meter(s) with Leominster to that total annual average flow measured at the Leominster Wastewater Treatment Plant, for the immediate past fiscal year. Lunenburg shall pay an amount annually to Leominster within 60 days of the close of Leominster's fiscal year for Lunenburg's share of the debt service costs realized in the fiscal year just closed. Lunenburg's share shall be determined by first determining the ratio of Lunenburg's annual average flow measured at the connection meter(s) with Leominster to the total annual average flow measured at the Leominster Wastewater Treatment Plant for the fiscal year just closed. The total eligible debt service costs carried by Leominster shall then be multiplied by this ratio to determine the amount due and payable from Lunenburg for the just-closed fiscal year. Any debt incurred by Leominster within the ambit of paragraph 19 after the execution of this Agreement and before the effective date of termination shall be paid by Lunenburg at its proportionate share until the debt is retired. Lunenburg shall not have to pay any portion of Leominster's debt for capital improvements commenced after either party has sent a Notice of termination unless such capital improvement(s) directly benefit Lunenburg for the duration of the contract and the contract actually terminates and then only in its proportionate share.

19.3 The Town shall have the right to inspect and audit at the City offices any and all cost records of the City relating to the construction, expansion, replacement, modification, operation and maintenance of the plant and facilities as stated in this Article.

20. Sewer Use Ordinance

20.1 Lunenburg's sewer use regulations shall be no less stringent in every particular and, as broad in scope as, or stricter than the current Leominster Sewer Ordinance. The Lunenburg regulations shall in any event be consistent with and meet all requirements of the EPA as presently codified at 40 CFR Part 403 and as the same may from time to time be amended. For purposes of this section and related sections the term "regulations" shall also mean by-law.

20.2 Lunenburg's adoption of such valid regulations and its establishment of local limits as set forth in this section at (20.5) shall constitute a condition precedent to the existence of this Agreement. Leominster shall have no obligation to accept wastewater from Lunenburg until the regulations are duly enacted and effective.

20.3 Lunenburg shall submit its regulations to Leominster for review within ninety (90) days of the date of execution of this Agreement. Leominster shall submit its comments and proposed changes to Lunenburg. Lunenburg will modify its regulations in accordance with Leominster's reasonable requirements within sixty (60) days of the receipt of Leominster's approval of the regulations.

20.4 Whenever Leominster revises its sewer use ordinance, it will forward a copy of the revisions to Lunenburg. Lunenburg will adopt revisions to its sewer regulations that are at least as stringent in every particular and as broad in scope as those adopted by Leominster. Lunenburg will submit its proposed revisions to Leominster for review within thirty days of its receipt of Leominster's revisions and will adopt its revisions within sixty (60) days of receiving approval from Leominster.

20.5 Lunenburg will adopt pollutant specific local limits which address the same pollutant parameters and are at least as stringent as the local limits enacted by Leominster within 100 days of the date this Agreement is executed. If Leominster makes any revisions or additions to its local limits, it will forward those revisions to Lunenburg which will adopt such revisions within 30 days after receipt thereof.

21. Enforcement Authority

21.1 Leominster, acting by and through its Department of Public Works, may perform at its discretion the technical and administrative duties necessary to implement and enforce Lunenburg's sewer use regulations. Leominster may: (1) enforce the terms and conditions of all permits issued by it under this Agreement; (2) issue permits only to all industrial users required to obtain a permit by Lunenburg's pre-treatment ordinance; (3) conduct inspections, sampling and analysis of permitted users; (4) take all enforcement actions against industrial users subject to pretreatment requirement, as set forth in Leominster's enforcement response plan and as provided in Lunenburg's sewer use ordinance; and (5) perform any other technical or administrative duties it deems appropriate. In addition, Leominster may, as agent of Lunenburg, take emergency action to stop, prevent or lessen any discharge which presents, or may present an imminent or immediate threat or danger to the health, safety or welfare of human beings or which reasonably appears, in its discretion, to threaten the environment or which threatens to cause interference, pass through or sludge contamination.

21.2 Lunenburg hereby designates Leominster as the agent of Lunenburg for the purpose of the implementation and enforcement of Lunenburg's sewer use regulations against users located in and/or subject to Lunenburg's jurisdiction and connected to sewers tributary to

Leominster. Except for the administrative duties and enforcement set forth in paragraph 21.1 which are the obligations of Leominster, Lunenburg shall have the primary duty to administer and enforce its sewer regulations. Upon Lunenburg's failure to enforce, Leominster shall take any enforcement action which it deems necessary or which is necessary to enforce or compel compliance with EPA pretreatment standards, regulations and policies. Leominster may take any action under Lunenburg's sewer use regulations which Lunenburg could take including but not limited to enforcement by administrative fines, or civil or criminal enforcement in any appropriate court. Lunenburg's regulations shall restate this agency and shall require any Lunenburg consumer to consent formally to the provisions of this agency. All administrative and judicial civil penalties and fines assessed by or for Leominster pursuant to this agency authority shall be the property of, and paid to, Leominster.

21.3 Before an industrial user or any other user subject to pretreatment standards discharges into Lunenburg's sewer system any wastewater which will be discharged into Leominster's system under the terms of this Agreement the user shall obtain a permit from Leominster in accordance with the Leominster and Lunenburg sewer use ordinance.

21.4 Lunenburg will reimburse Leominster for all Leominster's reasonable costs incurred in implementing and enforcing Lunenburg's sewer use regulations within thirty days after receipt of an accounting of all such costs; provided, however, that Leominster shall first use its best efforts to recover such costs from the users responsible for the violation.

21.5 If the authority of Leominster to act as agent for Lunenburg under this Agreement is called into question by any user, court, state or federal agency, department, board or otherwise, Lunenburg will take whatever action is necessary to ensure the implementation and enforcement of its sewer use regulations to the fullest extent against its users including but not limited to implementing and enforcing its regulations on its own behalf and/or amending this Agreement or its regulations to clarify Leominster's authority. If for any reason Leominster's authority as agent is not recognized and Leominster asks Lunenburg to enforce its regulations or clarify Leominster's authority, Lunenburg shall do so.

21.6 The parties will review and revise this Agreement to ensure compliance with the United States Clean Water Act, 42 U.S.C. ~ 1251 et seq. and the rules and regulations promulgated thereunder as necessary, but at least once every three years on a date to be determined by the parties.

21.7 Nothing contained herein shall be construed as limiting in any way Lunenburg's authority to enforce its sewer regulations.

22. Definitions of Terms

"EPA" shall mean the United States Environmental Protection Agency or where appropriate the Regional Water Management Division Director or other authorized official of the agency.

"Leominster" or "City" shall mean the City of Leominster or where appropriate the City of Leominster acting by and through its Department of Public Works.

"Lunenburg" or "Town" shall mean the Town of Lunenburg.

"Act" or "the Act" shall mean the Federal Water Pollution Control Act, also known as the Clean Water Act as amended. 33 U.S.C. 1251, et seq.

"DEP" or "MA DEP" shall mean the Massachusetts Department of Environmental Protection.

"Discharge" or "indirect discharge" shall mean the introduction of pollutants into the public owned treatment works from any non-domestic source regulated under the Act.

"BOD" or "Biochemical Oxygen Demand" shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures for five days at 20 deg. centigrade expressed as a concentration (e.g. as mg/l).

"Person" shall mean every individual, partnership, corporation, municipal corporation, water district, firm, association or group of individuals.

"Lunenburg's customer or consumers" shall mean those persons in Lunenburg to whom Lunenburg sells or distribute sewage disposal from Leominster under this Agreement.

"Normal Strength Sewage (Wastewater)" as expressed or referred to in this Agreement shall be defined as sewage having a five day biochemical oxygen demand (BOD) less than or equal to 250 mg/L and a total suspended solids concentration less than or equal to 300 mg/L based upon a 24 hour composite sample comprised of at least 6 discrete samples.

"User" as used herein shall mean a source discharge or indirect discharge.

Any word or phrase used in this Agreement not otherwise expressly defined herein shall have the meaning assigned to them as set forth in the Leominster Sewer Ordinance.

23. Service of Notice

23.1 All notices or communications permitted or required by this Agreement must be in writing except in emergencies, and shall:

As to Leominster, be delivered or mailed by certified mail, return receipt requested, to the Mayor's Office, 25 West Street, Leominster, MA 01453, and the office of the Department of Public Works, 189 Graham Street, Leominster, MA 01453.

As to Lunenburg, be delivered or mailed by certified mail, return receipt requested, to the Board of Selectmen's Office, P.O. Box 135, 17 Main Street, Lunenburg, MA 01462, and the office of the official designated by Lunenburg pursuant to Section 6.4 of this Agreement.

24. Extension of Term

24.1 The parties during the 23rd year of this Agreement, unless it is sooner terminated, shall meet to negotiate in good faith for an extension or renewal of this Agreement subject to authorizations that may be required by then applicable law. This acknowledgment that the term of the Agreement, including any new terms or conditions, may be extended, does not impose on either party any express or implied obligations with regard to the potential negotiations or Agreement. Neither party has any added or implied obligation to extend or renew the terms of the Agreement (with or without modifications).

25. Forum and Choice of Law

25.1 This Agreement and any performance under it shall be interpreted and governed in accordance with the laws of the Commonwealth of Massachusetts except for those requirements, terms, duties and conditions regulated by federal law. Any and all proceedings or actions relating to the subject matter herein shall be brought and maintained in the courts of the Commonwealth which shall have exclusive jurisdiction thereof. Any term or word used herein not otherwise defined shall have the same meaning as the term or word is defined in the Leominster Sewer Ordinance.

26. Regulatory Authority

26.1 This Agreement is subject to the lawful rules, regulations, decisions, order or directives of the EPA and of any agency of the state and federal government with jurisdiction over the parties or subject matter of the Agreement. Any and all conditions, rules, regulations, orders or other requirements heretofore or hereafter placed upon Leominster or Lunenburg by the EPA or by the Department of Environmental Protection or any other agency, division, office or department of the United States or the Commonwealth of Massachusetts or by any court of competent jurisdiction and by any other applicable Federal, state or county agency, shall be construed to become a part of this Agreement unless the Agreement is terminated hereunder. Further, any additional costs placed upon Leominster as a result of any orders of the above-referenced court or agencies in connection with the supplying of sewage disposal to Lunenburg by Leominster shall be borne by Lunenburg.

27. Severability. Headings. Integration

27.1 If any provision of this Agreement is declared or found illegal, unenforceable or void, then both parties shall be relieved of all obligations under that provision. The remainder of the Agreement shall be enforced to the fullest extent permitted by law. The headings are used for reference only and shall not be a factor in the interpretation of this Agreement. This Agreement shall supersede all other verbal and written Agreements and negotiations by the parties relating to performance of the obligations under this Agreement and contains to full and complete and integrated agreement of the parties on the subject matters referred to herein. Any doubt as to meaning, any interpretation issue or any question as to intent of the parties shall be resolved to make this Agreement and the obligations of the parties under it, conforms to the letter purpose and intent of the EPA pre-treatment standards and the Act.

IN WITNESS WHEREOF, on the date first mentioned, the officials of the City of Leominster and the Town of Lunenburg hereto execute this Agreement, in quadruplicate copies. When executed, the Agreement shall be recorded in the office of the Clerk of each municipality.

CITY OF LEOMINSTER

(Seal of the City of Leominster)

By ______________________
Mayor of Leominster

Approved as to form and legality

By ______________________
City Solicitor

By ______________________
Director, Department of Public Works

TOWN OF LUNENBURG

(Seal of the Town of Lunenburg)

By Joseph R. B[illegible]
Selectman

By ______________________
Selectman

By [illegible] M. [illegible]
Selectman

Approved as to form and legality

By ______________________
Town Counsel

<u>APPENDIX J</u>
Intermunicipal Agreement - Lunenburg

INTERMUNICIPAL AGREEMENT

FOR

WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

BETWEEN

CITY OF FITCHBURG, MASSACHUSETTS

AND

TOWN OF LUNENBURG, MASSACHUSETTS

Preamble

THIS AGREEMENT made and entered into this 11th day of March, 1994, and executed in quadruplicate (each executed copy constituting an original) between the City of Fitchburg (hereinafter "Fitchburg") and the Town of Lunenburg (hereinafter "Lunenburg").

WITNESSETH:

WHEREAS, the City of Fitchburg owns and operates a wastewater treatment system; and

WHEREAS, Lunenburg intends to construct a limited sewer system along Route 2A in Lunenburg to the Lunenburg Fitchburg line where it will connect with the Fitchburg sewer system; and

WHEREAS, Fitchburg, in and under the terms and conditions as listed herein, desires to sell sewage disposal capacity to Lunenburg; and

WHEREAS, Lunenburg, in and under the terms and conditions as listed herein, desires to purchase sewage disposal capacity from Fitchburg; and

WHEREAS the parties recognize that Fitchburg must implement and enforce a pretreatment program to control discharges from certain users of its wastewater treatment system under the Clean Water Act, 42 U.S.C. § 1251 et seq. and requirements set forth at 40 CFR Part 403; and

WHEREAS, the parties are authorized by Chapter 40, Section 4 and 4A of the General Laws to enter into an Intermunicipal Agreement for the purpose of the City of Fitchburg supplying sewage disposal to the Town of Lunenburg, subject to authorization by the Fitchburg City Council and the Lunenburg Town Meeting; and

WHEREAS, at present there are no existing facilities in Lunenburg to be served by the proposed sewer system which will discharge industrial waste to the Fitchburg system; and

NOW THEREFORE, in consideration of the mutual covenants and agreements hereinafter contained, the parties agree as follows:

1. Term/Purpose/Intent

1.1 The term of this Agreement shall be for a period of twenty-five (25) years from date hereof, unless sooner terminated as herein provided. The parties intend that the municipal corporations entering into this Agreement are the sole and exclusive beneficiaries of the Agreement. Subject to the terms and limits of this Agreement and of applicable state and federal law, the City of Fitchburg acting through its Wastewater Treatment Facilities Commission will provide sewer service to the Town of Lunenburg in consideration for payment of applicable sewer use rates and fees.

1.2 This Agreement shall not take effect until it has been authorized by the Fitchburg City Council and the Lunenburg Town Meeting.

1.3 Fitchburg shall use its best efforts to be at all times in compliance with the

NDPDES permit issued for the facility and to comply with all state and federal laws, regulations, water quality standards, orders, decrees of any state and/or federal governmental authority having jurisdiction over the treatment and disposal of waste waters.

1.4 Characteristics of waste delivered to the facility by or from Lunenburg shall at all times conform to standards set by Rules and Regulations of the U.S. Environmental Protection Agency (hereinafter called "EPA") and the MA DEP and Fitchburg's Sewer Use Ordinance, all as issued and amended from time to time.

2. Amendments

2.1 No officer, official, agent, or employee of Fitchburg or Lunenburg shall have the power to amend, modify or alter this Agreement or waive any of its provisions or to bind Fitchburg or Lunenburg by making any promise or representation not contained herein except by an amendment, in writing, executed by both municipal corporations in the same manner as this Agreement is executed. Neither party may rely on any conduct, statements, action, inaction or course of conduct of the employees, agents or officers of the other party as having changed, modified or amended this Agreement. Neither party shall be construed as waiving any provision of the Agreement unless the waiver is executed in writing as an amendment to this Agreement. No waiver by either party of any default of breach shall constitute a waiver of any subsequent default or breach. Forbearance or indulgence in any form or manner by either party shall not be construed as waiver of any term or condition hereto nor shall it limit the legal or equitable remedies available to that party.

3. Assignment

3.1 This Agreement shall not be assigned or transferred by either party, without the express written consent of the other party given with the same formalities as are required for the execution of this Agreement.

4. Hold Harmless/Indemnification

4.1 To the extent permitted by law, Lunenburg hereby agrees to indemnify and save harmless Fitchburg or its agents against any and all liability or claims arising from the acts or omissions of Lunenburg or its agents or employees relating to Lunenburg's performance under this Agreement, including but not limited to liability deriving from state and federal environmental administrative findings or orders or actions or claims for damages on account of injury to person, or property or the environment caused by any act or omission of Lunenburg, it agents or employees or any fine, penalties or monetary awards which arise out of Lunenburg's acts or omissions under the terms of this Agreement.

5. Force Majeure

5.1 No failure or delay in performance shall be deemed to be a breach of this Agreement when such failure or delay is occasioned by or due to any Act of God, strike, lockout, war, riot, epidemic, explosion, sabotage, breakage or accident to machinery or lines or pipe, the binding order of any court or governmental authority, or any other cause whether of the kind herein enumerated or otherwise not within the control of the party against whom a breach is alleged.

6. Reports/Records/Rate Schedules

6.1 Annually, during the first week of February, Lunenburg and Fitchburg shall mutually exchange records pertinent to the flows from each municipality. The records shall include the average daily flow for each month. The annual flow data will be reconciled against the allocated treatment capacity for the Town and the City. The Town and the City will also furnish data on the expected flows for the upcoming year, the amount of committed but unconnected capacity, and uncommitted capacity.

6.2 Upon Fitchburg's request, Lunenburg shall provide reports and records giving the names and addresses of all Lunenburg's customers and showing the location to which sewage is being accepted, character of occupancy, and amount of sewage produced on a monthly basis by each customer and any other reports, records or data reasonably required by Fitchburg.

6.3 At the end of each fiscal year, and no later than July 31st after the close of such fiscal year, Lunenburg shall give Fitchburg a written copy of Lunenburg's prevailing sewer rate schedule as applicable to the sewer consumers serviced by Fitchburg sewer and shall provide any other documents requested by Fitchburg. The schedule shall also include all rates and relevant information based on which rates have been formulated.

6.4 Upon request, Lunenburg shall give Fitchburg a report showing the amount of sewage received from Lunenburg, the amount which Lunenburg received from each of its customers and the amount it billed to each of Lunenburg's customers during any period. Lunenburg shall also furnish sewer system plans, zoning maps, and such other information regarding billing, collection and delinquencies as Fitchburg may request from time to time.

6.5 Lunenburg shall maintain written records and billing systems from which it can prepare the reports required under this Agreement. Fitchburg by its officers or employees shall have the right to inspect these original records and systems and to make copies thereof upon request.

6.6 Lunenburg shall notify Fitchburg in writing and keep Fitchburg informed of the name and title of its official or officials responsible for sewage services in Lunenburg and for implementation of the terms of this Agreement. If Lunenburg fails to do so, it shall be deemed to have designated the Executive Secretary.

7. Inspections

7.1 Fitchburg has the right to inspect and test any equipment which Lunenburg is required to install and/or maintain under the Agreement. Fitchburg can require Lunenburg to repair and replace any such equipment. If Lunenburg fails to replace or repair any such item, within a reasonable time under the circumstances and as set forth in written notice to Lunenburg, Fitchburg may do so and bill Lunenburg for the cost thereof. Payment shall be due within thirty days after Fitchburg mails or delivers a billing statement to Lunenburg.

7.2 Fitchburg has the right to inspect facilities and equipment in Lunenburg which may affect the sewage system. These inspections and any inspections permitted under this Agreement may include any and all tests Fitchburg deems necessary. Lunenburg hereby consents to Fitchburg's entry onto or into property of Lunenburg for the purpose of any inspection or repair, installation or maintenance which Fitchburg may require under this Agreement. Fitchburg will not, except as expressly set forth in this Agreement, perform any work in Lunenburg but will require work, as needed, to Fitchburg's specifications for all extensions of sewer lines.

8. Remedies

8.1 In addition to the remedies, power and authority which the Wastewater Treatment Facilities Commission has under ordinances of the City of Fitchburg, the following remedies apply:

a) If either party fails to fulfill any obligation or condition of this Agreement, the other party has the right to terminate this Agreement by giving sixty (60) days notice, in writing, of its intent to do so. Upon receipt of such notice the party shall have the right to prevent termination by curing the default within thirty (30) days. Termination shall not release Lunenburg from its obligation to pay all bills or sums due in accordance with this Agreement.

b) Both parties reserve the right, either in law or equity, by suit, and complaint in the nature of mandamus, or other proceeding, to enforce or compel performance of any or all covenants herein.

c) Any bill remaining unpaid after the thirtieth day from the date of billing shall bear interest at the rate of prime plus 2% annually computed from the end of the period payment is due.

d) If an administrative agency, board, commission or division of the state or federal government or any court impairs, alters, restricts or limits, directly or indirectly Fitchburg's rights, powers or authority to maintain, sell, contract for, or permit sewage disposal as described in this Agreement, Fitchburg in its sole discretion may terminate and void this Agreement by written notice to Lunenburg. Termination under this clause shall not release Lunenburg from its obligation to pay any sums due and all bills owed for services previously rendered unless to do so would be in violation of a final administrative or judicial decree, order or ruling. The notice of termination shall be given within five business days after Fitchburg receives written notice of the action or decision of such agency, board, commission, division or court. It is the intent of this notice provision to give Lunenburg as much advance notice as possible consistent with Fitchburg's need to terminate. Fitchburg will notify Lunenburg of the formal institution of any proceedings or the issuance of any formal order so that Lunenburg may, if it chooses, participate in such proceedings or challenge any such order.

e) If either party fails to perform any obligation under this Agreement, the other party may perform on behalf of the defaulting party and charge the reasonable costs thereof, including administrative time, to the defaulting party as a sum due under the Agreement provided written notice is given to the defaulting party allowing it a reasonable time to cure the default.

f) Fitchburg may in its sole discretion immediately stop providing service to Lunenburg: (1) if Lunenburg fails to cure any default within thirty (30) days after written notice a provided in paragraph 8.1(a); or (2) if Lunenburg or any consumer utilizing Lunenburg's access to Fitchburg's sewer system, by act or omission violates or fails to comply with any notice or order of the Commission permitted or required under EPA's pretreatment regulations or violates any requirement imposed by the EPA regulating wastewater discharge, treatment or pretreatment.

g) Either party may terminate this Agreement without cause, for any reason or no reason, by written notice to the other at least two years in advance of the termination date. Termination shall not release Lunenburg from its obligation to pay all bills or sums due in accordance with this Agreement.

h) The remedies set forth in this Agreement are cumulative. The election of one does not preclude use of another.

9. Emergencies

9.1 Each party shall immediately notify the other of any emergency or condition in either party's system of which it learns may affect sewer disposal system in either municipality.

10. Incorrect Meter Readings

10.1 When Fitchburg determines that a sewer meter has registered incorrectly, the Commission shall prepare an estimate of the amount of sewage accepted through the faulty meter for the purposes of billing Lunenburg. Fitchburg shall present evidence to Lunenburg demonstrating that the meter is reading incorrectly, justifying its estimate of sewage flow for the billing period. The estimate shall be based upon the average of three (3) preceding readings of the meters, exclusive of incorrect readings. When less than three (3) correct readings are available, fewer readings, including some obtained after the period of incorrect registration, may be used.

11. Lunenburg/Fitchburg Employees

11.1 Employees, servants, or agents of either municipality shall not be deemed to be agents, servants or employees of the other municipality for any purpose including but not limited to either Workers' Compensation or unemployment insurance purposes.

12. Method of Supply

12.1 Lunenburg agrees to purchase sewage disposal services and capacity from Fitchburg in accordance with the terms and conditions of this Agreement. Lunenburg shall be entitled to discharge 100,000 gallons per day of Normal Strength Wastewater into Fitchburg's sewer collection system at a metered location at the City of Fitchburg line on Route 2A in Lunenburg. Lunenburg will construct a second point of connection with Fitchburg with a metering station at a location near Poplar and Summer Streets, and will begin directing all sewage through said new line into Fitchburg's sewer collection system once the average flows from Lunenburg exceed 100,000 gallons per day. When Lunenburg begins using the line it shall discontinue the use of the Route 2A connection. This Route 2A connection shall be available only as an emergency connection, as controlled and determined by Fitchburg. The Commission may authorize additional entrance connections at Lunenburg's request.

12.2 Fitchburg shall approve all connections by Lunenburg to the Fitchburg wastewater system. Lunenburg shall construct and maintain a flow measuring station at each approved connection, suitable to continuously measure and record all flows entering the Fitchburg sewer system. Fitchburg shall have the right of access to said metering stations for purposes of inspection and data acquisition. Fitchburg must approve the measuring system design before Lunenburg begins construction.

12.3 All sewer (wastewater) flows expressed or referred to within this Agreement (unless otherwise noted) are monthly average flows, and are computed based upon the most recent calendar month total flow measured at the metered connection, divided by the number of days in the month.

13. Use Restriction

13.1 Lunenburg shall use the sewage capacity furnished under this Agreement solely for its municipal wastewater and for wastewater generated by persons subject to its or Fitchburg's jurisdictional control and within Lunenburg's corporate limits. Lunenburg shall not permit any sewage capacity furnished hereunder to be used by any person outside of Lunenburg's territorial limits without the express written consent of Fitchburg in each instance.

14. Reserved Capacity

14.1 Fitchburg agrees to permit Lunenburg to discharge flows up to 500,000 gallons per day through connections with the Fitchburg sewer system during the term of this Agreement (Reserved Capacity) but only if Lunenburg prepares and completes a Facilities Plan as set forth in Section 14.2. Any portion of this capacity not utilized by Lunenburg by the tenth anniversary of the date of the first wastewater flows under this Agreement shall be forfeited by the Town of Lunenburg. "Capacity Not Utilized" shall be calculated for the purpose of this paragraph as the difference between 460,000 gallons per day and the highest average monthly flow from Lunenburg recorded in years 8, 9 or 10 of this Agreement.

14.2 The Reserved Capacity cited in Section 14.1 shall be available only upon the satisfactory completion by the Town of Lunenburg of a Facilities Plan performed in accordance with Massachusetts Department of Environmental Protection regulations; and only if the Facilities Plan demonstrates a need for the Reserve Capacity of 500,000 gallons per day within the first 10 years of the date of this Agreement and only if the Town of Lunenburg completes the Facilities Plan within 4 years of the date of this Agreement. If the

Facilities Plan demonstrates a lower need for capacity, this lower need shall become the Reserved Capacity for the purposes of Section 14.1 (Lower Reserved Capacity), and Capacity Not Utilized for the purposes of Section 14.1 shall be determined as the Lower Reserved Capacity minus 40,000 gallons per day minus the highest average monthly flow from Lunenburg recorded in years 8, 9 or 10 of this Agreement.

14.3 This Section exists for the purposes of explaining the need for the 500,000 gallons per day of Reserved Capacity, but not for the purpose of interpretation or enforcement of any other provision of this Agreement. The following table presents a preliminary estimate of the demands for wastewater capacity over the next 5 years.

Contributor	Estimated Flow(gal/day)	Comment
Maplewood Condominiums	99,000	Full buildout, off Northfield Road
Lunenburg Nominee Trust	35,200	Subdivision behind Lunenburg Crossing
Lunenburg Crossing	14,153	CBL Development
Blueberry Hills (including gold course)	16,500	Off Northfield Road
Whalom Area	138,400	Includes Summer Street to City Line
Massachusetts Ave. Area	51,200	Route 2A Commercial and Residential
Electric Avenue Area	51,200	
Pleasant Street	51,200	
Total Estimated Flow	456,853 Say 500,000 gal/day	

15. Funding and Appropriations

15.1 Lunenburg agrees to appropriate annually sufficient money to pay for its obligations under this Agreement.

16. Connection Charge

16.1 Lunenburg agrees to pay Fitchburg a connection charge of $3.00/gallon of connected capacity. The first payment of $30,000 shall be made at the time of connection to the Fitchburg sewer system for the first 10,000 gallons per day of sewage flow. The next payment shall be made within 60 days of the end of that month in which the flow first exceeds 10,000 gallons per day, and shall be in the amount of $15,000 for the next 5,000 gallons per day increment. Subsequent payments of $15,000 shall be made within 60 days of the end of that month in which the flow first exceeds the previous 5,000 gallon per day increment for which the connection charge has been paid.

16.2 Upon the fifth anniversary of this Agreement, the connection charge shall increase in proportion to the ENR (Engineering News-Record) Construction Cost Index increases from that day forward.

17. User Fee

17.1 Lunenburg agrees to pay Fitchburg on a quarterly basis a user fee of $2.50 per hundred cubic feet of Normal Strength Wastewater. This is due and payable within 60 days after the End of the Quarter (End of Quarter defined as March 31, June 30, September 30, December 31). Fitchburg agrees that Lunenburg's rate shall not be increased for a period of three years from the date that Lunenburg's sewage first flows through the connection with

Fitchburg. Thereafter, any increase in Fitchburg's rate to its single family residential users shall also be added to the rate charged to Lunenburg, penny for penny per unit of flow.

17.2 Fitchburg may surcharge Lunenburg for discharge of wastewater containing pollutant levels exceeding concentrations found in Normal Strength Wastewater in proportion to the actual strength to the maximum normal strength based upon BOD or suspended solids, at Fitchburg's option.

18. Infiltration/Inflow Correction

18.1 Lunenburg agrees to make a series of payments to the City of Fitchburg towards reduction of excessive Infiltration/Inflow in the City's wastewater collection system. A payment of $42,000.00 will be made no later than the date of the first wastewater flows through the sewer connection between Lunenburg and Fitchburg at the City boundary on Route 2A. The second payment of $42,000.00 will be paid by the Town of Lunenburg on the day immediately following the first four consecutive month period in which monthly average wastewater flows from Lunenburg exceed 100,000 gallons per day each month. Each subsequent payment will be paid on the day following any four consecutive month period in which monthly average wastewater flows from Lunenburg exceeds the next incremental 100,000 gallons per day rate each month. The payment will be made to the City of Fitchburg in accordance with instructions received from the City's Wastewater Commissioners.

19. Capital Improvement Provision

19.1 In the event that the Fitchburg Wastewater Treatment Facilities Commission decides to repair or replace any item used at or in connection with its facilities and the cost of any single replaced or repaired item exceeds $100,000.00, or if Fitchburg is directed or ordered by EPA, DEP or any other Agency or Court of the state or federal government to provide a higher degree of treatment at the facility in the future, or otherwise to modify the process from that used or in place at the time of execution of this Agreement, the total cost of such replacement or additional facilities shall be apportioned between the parties as set forth in paragraph 19.2 of this Agreement.

19.2 Lunenburg agrees to pay Fitchburg a portion of Fitchburg's annual debt service resulting from said capital improvements to the East Fitchburg Wastewater Treatment Plant which become necessary after the date of this Agreement. In addition, Lunenburg shall participate in the cost of improvements to the sludge incinerator at the Fitchburg East Wastewater Treatment Plant which are required to meet current air emission regulations. Said improvements to the incinerator are understood by all parties to cost less than $5,000,000, and shall only include construction costs and shall be paid in accordance with the provisions of this paragraph. Lunenburg shall pay an amount annually to Fitchburg within 60 days of the close of Fitchburg's fiscal year for Lunenburg's share of the debt service costs realized in the fiscal year just closed. Lunenburg's share shall be determined by first determining the ratio of Lunenburg's annual average flow measured at the connection meter with Fitchburg to the total annual average flow measured at the East Fitchburg Wastewater Treatment Plant for the fiscal year just closed. The total eligible debt service costs carried by Fitchburg shall then be multiplied by this ratio to determine the amount due and payable from Lunenburg for the just closed fiscal year. Any debt incurred by Fitchburg within the ambit of paragraph 19 after the execution of this Agreement and before the effective date of termination shall be paid by Lunenburg at its proportionate share until the debt is retired. Lunenburg shall not have to pay any portion of Fitchburg's debt for capital improvements commenced after either party has sent a Notice of termination unless such capital improvement(s) directly benefit Lunenburg for the duration of the contract and the contract actually terminates and then only in its proportionate share.

19.3 The Town shall have the right to inspect and audit at the City offices any and all cost records of the City relating to the construction, expansion, replacement, modification, operation and maintenance of the plant and facilities as stated in this Article.

20. Sewer Use Ordinance

20.1 The Town of Lunenburg shall adopt local sewer use regulations which are no less stringent in every particular and, is as broad in scope as, or stricter than the Fitchburg Sewer Ordinance presently codified in Chapter 147 of the Code of the City of Fitchburg as amended through August 31, 1993. The Lunenburg regulations shall in any event be consistent with and meet all requirements of the EPA as presently codified at 40 CFR Part 403 and as the same may from time to time be amended. The regulations will designate the Commission as Lunenburg's agent to enforce its provisions. In the alternative, Lunenburg may adopt a sewer use bylaw, meeting the same standards set forth herein. If it appears that the Lunenburg Sewer Commission lacks or may lack the authority to adopt such regulations in whole or in part then the Town shall adopt a by-law meeting the requirements of this Section. For purposes of this section and related sections the term "regulations" shall also mean by-law.

20.2 Lunenburg's adoption of such valid regulations and its establishment of local limits as set forth in this section at (20.5) shall constitute a condition precedent to the existence of this Agreement. Fitchburg shall have no obligation to accept wastewater from Lunenburg until the regulations are duly enacted and effective.

20.3 Lunenburg shall submit a draft of its proposed regulations to Fitchburg for review within 90 days of the date of execution of this Agreement. Fitchburg shall submit its comments and proposed changes to Lunenburg. Lunenburg will adopt its regulations as modified by Fitchburg within 60 days of the receipt of Fitchburg's approval of the regulations.

20.4 Whenever Fitchburg revises its sewer use ordinance, it will forward a copy of the revisions to Lunenburg. Lunenburg will adopt revisions to its sewer regulations that are at least as stringent in every particular and as broad in scope as those adopted by Fitchburg. Lunenburg will submit its proposed revisions to Fitchburg for review within thirty days of its receipt of Fitchburg's revisions and will adopt its revisions within sixty (60) days of receiving approval from Fitchburg.

20.5 Lunenburg will adopt pollutant specific local limits which address the same pollutant parameters and are at least as stringent as the local limits enacted by Fitchburg within 100 days of the date this Agreement is executed. If Fitchburg makes any revisions or additions to its local limits, it will forward those revisions to Lunenburg which will adopt such revisions within 30 days after receipt thereof.

21. <u>Enforcement Authority</u>

21.1 Fitchburg, acting by and through its Wastewater Treatment Facilities Commission, will perform the technical and administrative duties necessary to implement and enforce Lunenburg's sewer use regulations. Fitchburg may: (1) enforce the terms and conditions of all permits issued by it under this Agreement; (2) issue permits only to all industrial users required to obtain a permit by Lunenburg's pre-treatment ordinance; (3) conduct inspections, sampling and analysis of permitted users; (4) take all enforcement actions against industrial users subject to pretreatment requirement, as set forth in Fitchburg's enforcement response plan and as provided in Lunenburg's sewer use ordinance; and (5) perform any other technical or administrative duties it deems appropriate. In addition, Fitchburg may, as agent of Lunenburg, take emergency action to stop, prevent or lessen any discharge which presents, or may present an imminent or immediate threat or danger to the health, safety or welfare of human beings or which reasonably appears, in its discretion, to threaten the environment or which threatens to cause interference, pass through or sludge contamination.

21.2 Lunenburg hereby designates Fitchburg as the agent of Lunenburg for the purpose of the implementation and enforcement of Lunenburg's sewer use regulations against users located in and/or subject to Lunenburg's jurisdiction. Except for the administrative duties and enforcement set forth in paragraph 21.1 which are the obligations of Fitchburg, Lunenburg shall have the primary duty to administer and enforce its sewer regulations. Upon Lunenburg's failure to enforce, Fitchburg shall take any enforcement action which it deems necessary or which is necessary to enforce or compel compliance with EPA pre-treatment standards, regulations and policies. Fitchburg may take any action under Lunenburg's sewer use regulations which Lunenburg could take including but not limited to enforcement by administrative fines, or civil or criminal enforcement in any appropriate court. Lunenburg's regulations shall restate this agency and shall require any Lunenburg consumer to consent formally to the provisions of this agency. All administrative and judicial civil penalties and fines assessed by or for Fitchburg pursuant to this agency authority shall be the property of, and paid to, Fitchburg.

21.3 Before an industrial user or any other user subject to pretreatment standards discharges into Lunenburg's sewer system any wastewater which will be discharged into Fitchburg's system under the terms of this Agreement the user shall obtain a permit from Fitchburg in accordance with the Fitchburg and Lunenburg sewer use ordinance.

21.4 Lunenburg will reimburse Fitchburg for all Fitchburg's reasonable costs incurred in implementing and enforcing Lunenburg's sewer use regulations within thirty days after receipt of an accounting of all such costs; provided, however, that Fitchburg shall first use its best efforts to recover such costs from the users responsible for the violation.

21.5 If the authority of Fitchburg to act as agent for Lunenburg under this Agreement is called into question by any user, court, state or federal agency, department, board or otherwise, Lunenburg will take whatever action is necessary to ensure the implementation and enforcement of its sewer use regulations to the fullest extent against its users including but not limited to implementing and enforcing its regulations on its own behalf and/or amending this Agreement or its regulations to clarify Fitchburg's authority. If for any reason Fitchburg's authority as agent is not recognized and Fitchburg asks Lunenburg to enforce its regulations or clarify Fitchburg's authority, Lunenburg shall do so.

21.6 The parties will review and revise this Agreement to ensure compliance with the United States Clean Water Act, 42 U.S.C. § 1251 et seq. and the rules and regulations promulgated thereunder as necessary, but at least once every three years on a date to be determined by the parties.

21.7 Nothing contained herein shall be construed as limiting in any way Lunenburg's authority to enforce its sewer regulations.

22. Definitions of Terms

"EPA" shall mean the United States Environmental Protection Agency or where appropriate the Regional Water Management Division Director or other authorized official of the agency.

"Fitchburg" or "City" shall mean the City of Fitchburg or where appropriate the City of Fitchburg acting by and through its Wastewater Treatment Facilities Commission.

"Lunenburg" or "Town" shall mean the Town of Lunenburg.

"Act" or "the Act" shall mean the Federal Water Pollution Control Act, also known as the Clean Water Act as amended. 33 U.S.C. § 1251, et seq.

"DEP" or "MA DEP" shall mean the Massachusetts Department of Environmental Protection.

"Discharge" or "indirect discharge" shall mean the introduction of pollutants into the public owned treatment works from any non-domestic source regulated under the Act.

"BOD" or "Biochemical Oxygen Demand" shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures for five days at 20° centigrade expressed as a concentration (e.g. as g/l).

"Person" shall mean every individual, partnership, corporation, municipal corporation, water district, firm, association or group of individuals.

"Lunenburg's customer or consumers" shall mean those persons in Lunenburg to whom Lunenburg sells or distribute sewage disposal from Fitchburg under this Agreement.

"Normal Strength Sewage (Wastewater)" as expressed or referred to in this Agreement shall be defined as sewage having a five day biochemical oxygen demand (BOD) less than or equal to 250 mg/L and a total suspended solids concentration less than or equal to 300 mg/L based upon a 24 hour composite sample comprised of at least 6 discrete samples.

"User" as used herein shall mean a source discharge or indirect discharge.

Any word or phrase used in this Agreement not otherwise expressly defined herein shall have the meaning assigned to them as set forth in the Fitchburg Sewer Ordinance.

23. Service of Notice

23.1 All notices or communications permitted or required by this Agreement must be in writing except in emergencies, and shall:

As to Fitchburg, be delivered or mailed by certified mail, return receipt requested, to the Mayor's Office, 718 Main Street, City Hall, Fitchburg, MA 01420, and the office of the Wastewater Treatment Facilities Commissioner at the same address.

As to Lunenburg, be delivered or mailed by certified mail, return receipt requested, to the Board of Selectmen's Office, P.O. Box 135, 17 Main Street, Lunenburg, MA 01462, and the office of the official designated by Lunenburg pursuant to Section 6.6 of this Agreement.

24. Extension of Term

24.1 The parties during the 23rd year of this Agreement, unless it is sooner terminated, shall meet to negotiate in good faith for an extension or renewal of this Agreement subject to authorizations that may be required by then applicable law. This acknowledgment that the term of the Agreement, including any new terms or conditions, may be extended, does not impose on either party any express or implied obligations with regard to the potential negotiations or Agreement. Neither party has any added or implied obligation to extend or renew the terms of the Agreement (with or without modifications).

25. Forum and Choice of Law

25.1 This Agreement and any performance under it shall be interpreted and governed in accordance with the laws of the Commonwealth of Massachusetts except for those requirements, terms, duties and conditions regulated by federal law. Any and all proceedings or actions relating to the subject matter herein shall be brought and maintained in the courts of the Commonwealth which shall have exclusive jurisdiction thereof. Any term or word used herein not otherwise defined shall have the same meaning as the term or word is defined in the Fitchburg Sewer Ordinance.

26. Regulatory Authority

26.1 This Agreement is subject to the lawful rules, regulations, decisions, order or directives of the EPA and of any agency of the state and federal government with jurisdiction over the parties or subject matter of the Agreement. Any and all conditions, rules, regulations, orders or other requirements heretofore or hereafter placed upon Fitchburg or Lunenburg by the EPA or by the Department of Environmental Protection or any other agency, division, office or department of the United States or the Commonwealth of Massachusetts or by any court of competent jurisdiction and by any other applicable Federal, state or county agency, shall be construed to become a part of this Agreement unless the Agreement is terminated hereunder. Further, any additional costs placed upon Fitchburg as a result of any orders of the above-referenced court or agencies in connection with the supplying of sewage disposal to Lunenburg by Fitchburg shall be borne by Lunenburg.

27. Severability, Headings, Integration

27.1 If any provision of this Agreement is declared or found illegal, unenforceable or void, then both parties shall be relieved of all obligations under that provision. The remainder of the Agreement shall be enforced to the fullest extent permitted by law. The headings are used for reference only and shall not be a factor in the interpretation of this Agreement. This Agreement shall supersede all other verbal and written Agreements and negotiations by the parties relating to performance of the obligations under this Agreement and contains to full and complete and integrated agreement of the parties on the subject matters referred to herein. Any doubt as to meaning, any interpretation issue or any question as to intent of the parties shall be resolved to make this Agreement and the obligations of the parties under it, conforms to the letter purpose and intent of the EPA pre-treatment standards and the Act.

Fitchburg shall have no obligation to accept Wastewater from Lunenburg until: (1) Lunenburg enacts and has in place the authority by-laws and regulations necessary to implement the provisions of the Agreement and pre-treatment requirements; and (2) until the EPA and DEP approve the Agreement as a substantial modification of the pre-treatment program.

IN WITNESS WHEREOF, on the date first mentioned, the officials of the City of Fitchburg and the Town of Lunenburg hereto execute this Agreement, in quadruplicate copies. When executed, the Agreement shall be recorded in the office of the Clerk of each municipality.

CITY OF FITCHBURG

(Seal of the City of Fitchburg)

By________________________
Mayor of Fitchburg

Approved as to form and legality

By________________________
City Solicitor

By________________________
Chairperson, Wastewater Treatment Facilities Commissioner

TOWN OF LUNENBURG

(Seal of the Town of Lunenburg)

By Joseph T. Battaglia

Approved as to form and legality

By________________________
Town Counsel

csewage.agr/jhd

APPENDIX K
Rating Matrix

APPENDIX K
LUNENBURG CWMP PHASE I RATING MATRIX

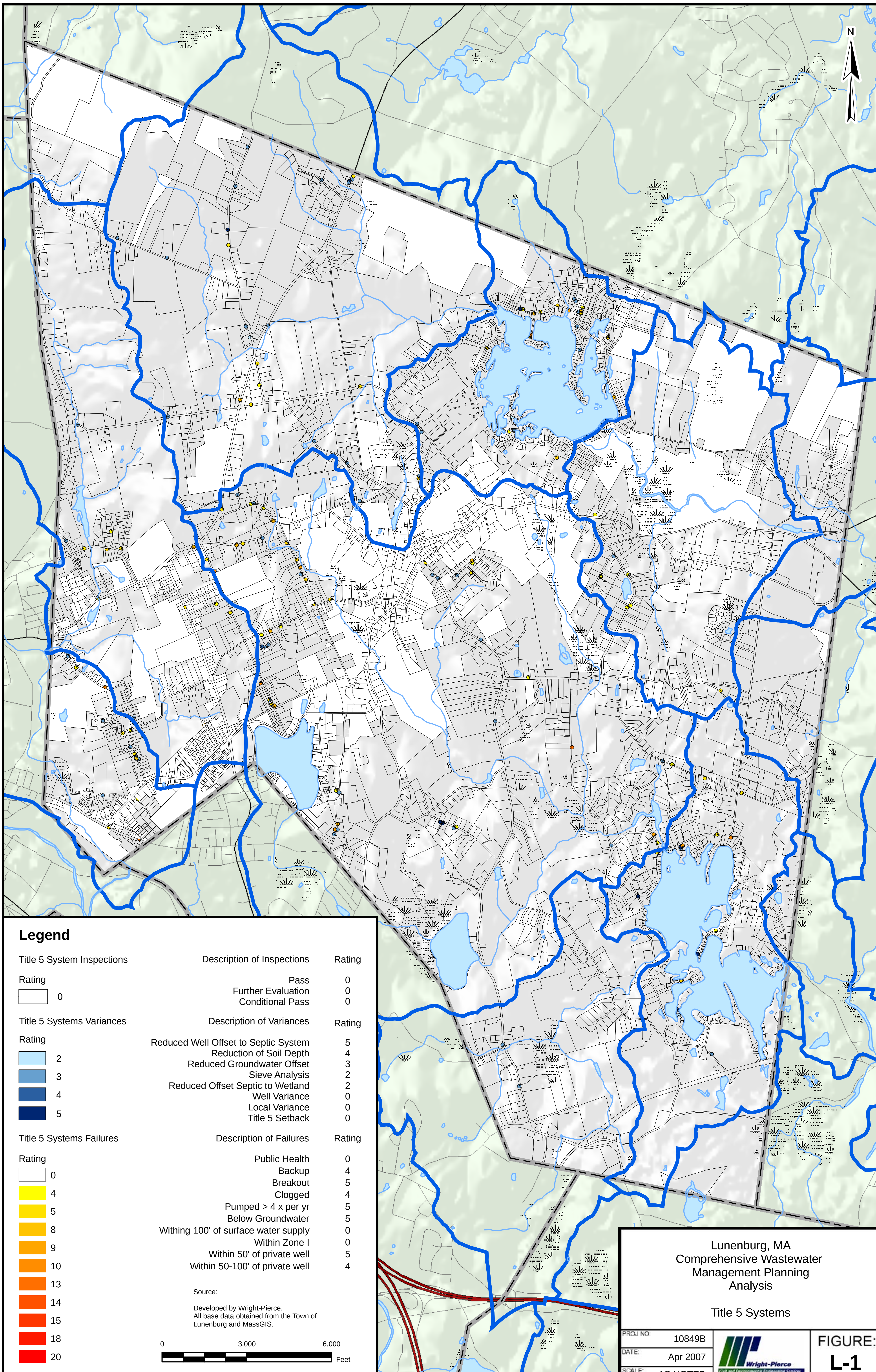
Tier 1		
Onsite Suitability/Public I		
Title 5 Systems		
	Pass	0
	Further Evaluation	0
	Conditional Pass	0
	Variance	
	Reduced Well Offset to Septic System	5
	Reduction of Soil Depth	4
	Reduced Groundwater Offset	3
	Sieve Analysis	2
	Reduced Offset Setic to Wetland	2
	Well Variance	0
	Local Variance	0
	Title 5 Setback	0
	Failures	
	Back up	4
	Breakout	5
	Clogged	4
	Pumped > 4 x per yr	5
	Below Groundwater	5
	Within 100' of surface water supply	0
	Within Zone I	0
	Within 50 ft of private well	5
	Within 50-100 ft of private well	4
Soils/Drainage Class		
	Well Drained	0
	Moderately Well Drained	1
	Somewhat Excessively Drained	2
	Excessively Drained	4
	Very Poorly Drained	5
	Pits, Gravel, Quarry, Excavated Materials	2
	Poorly Drained	3
	Urban Land	4
Depth to Bedrock		
	<100 cm	5
	>100 cm and < 200 cm	3
	>200 cm	0
Lot Sizes		

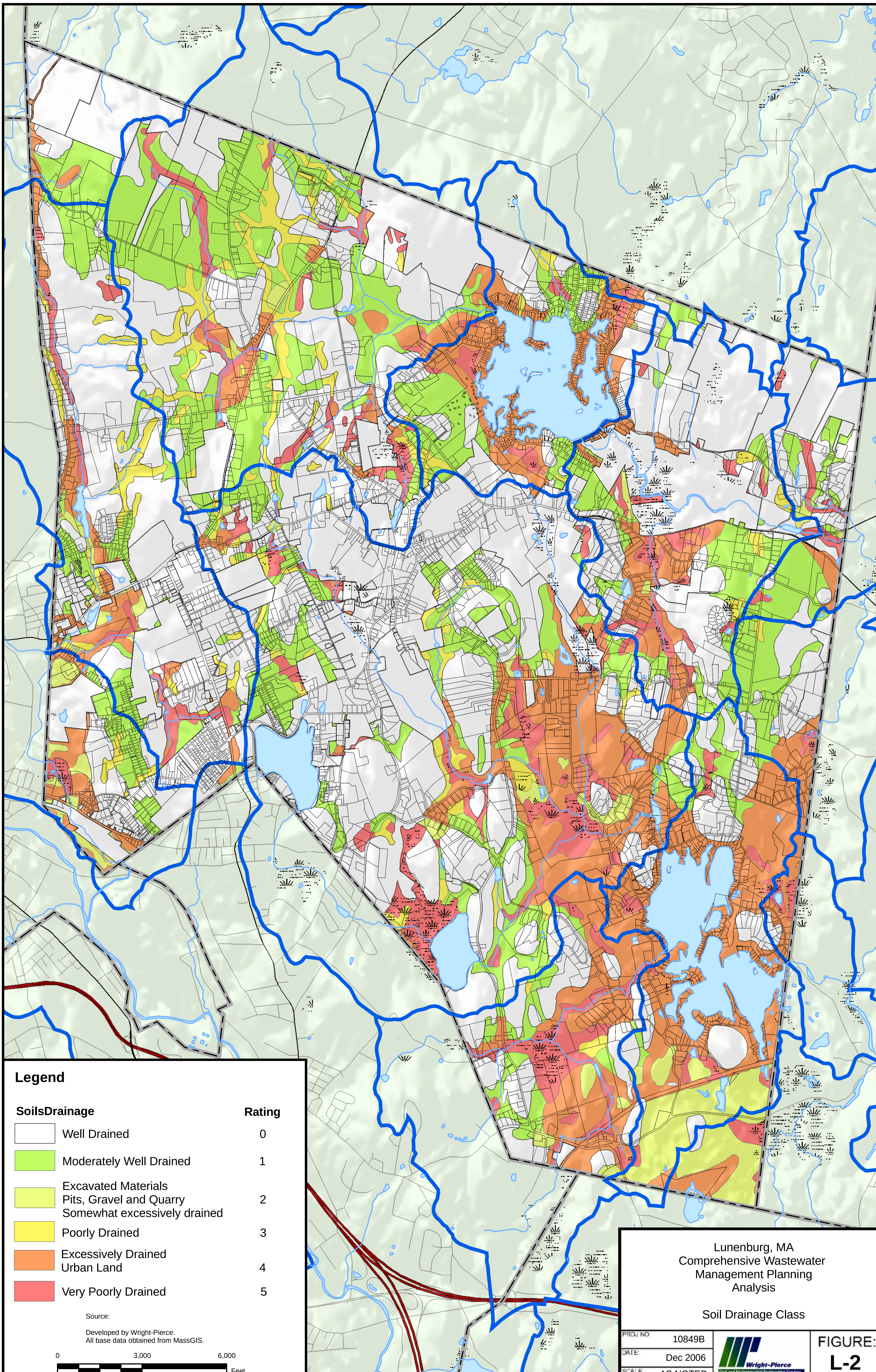
	<= 0.5	5
	0.5 < lot <= 1 acre	2
	> 1 acre	0
Water Supply Protection		
	Water	Remove water bodies from the needs analysis
Depth to Water Table - Annual - Minimum		
	0-4'	4
	4'-7'	2
	>7'	0
Lunenburg Water Resource Protection District		
Zone I, Zone II, Zone II, and potential future wells		
	Within WRPD	3
	Not Within WRPD	0
Protection of Surface Waters		
Areas with Regulated Setbacks		
	The buffer area is 50 feet around all hydrologic features and wetlands, except within the drainage basin for a public surface water supply, where the buffer zones are 100 feet around wetland features, 200 feet around streams and ponds, and 400 feet around public surface water supplies. Within Title 5 Regulated Setback	5
	Lunenburg BOH Regulations - 100 ft to any water course Within BOH Regulated Setback	4
	Not within setback	0
Floodplains		
	Within 100 yr Floodplain	4
	Within 500 yr Floodplain	2
	Not within floodplain	0
Preserving Community Character		
ACEC		
	Within ACEC	3
	Not within ACEC	0
Priority/Estimated Habitat Areas		
	Within Habitat	3
	Not within Habitat	0
Historic District		
	Within District	3
	Not within District	0
Open Space/Protected Lands		

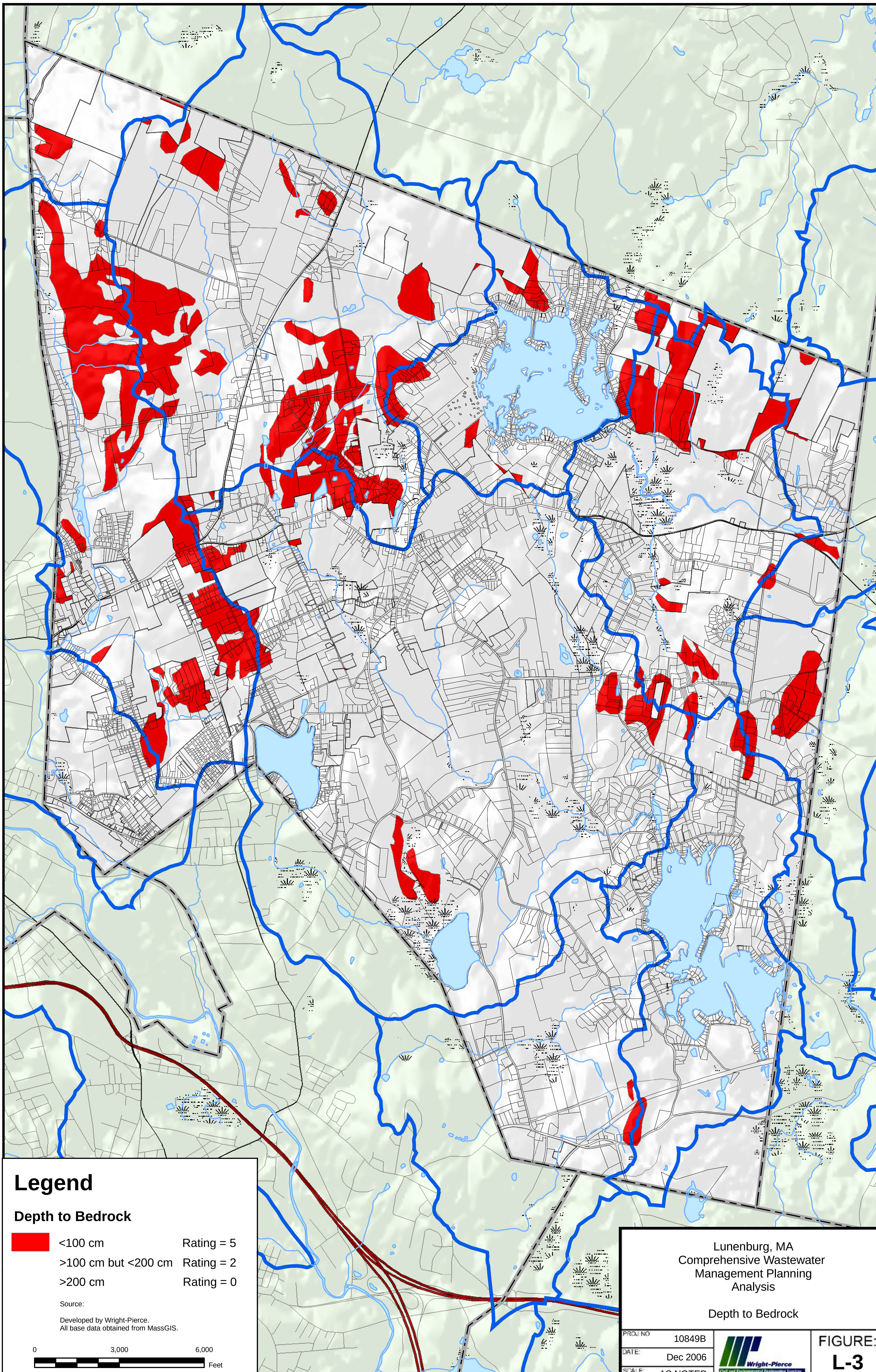
	Protected Lands	Remove protected lands from the needs analysis
	Cemeteries	Remove Cemeteries from the needs analysis
Managed Growth		
Areas Planned for Subdivisions	Map locations of Planned Subdivisions	
Zoning		
	Commercial	2
	Limited Business/Residential	2
	Office Park and Industrial	2
	Outlying	0
	Recreation	0
	Residence A	0
	Residence B	0
	Retail/Commercial	2

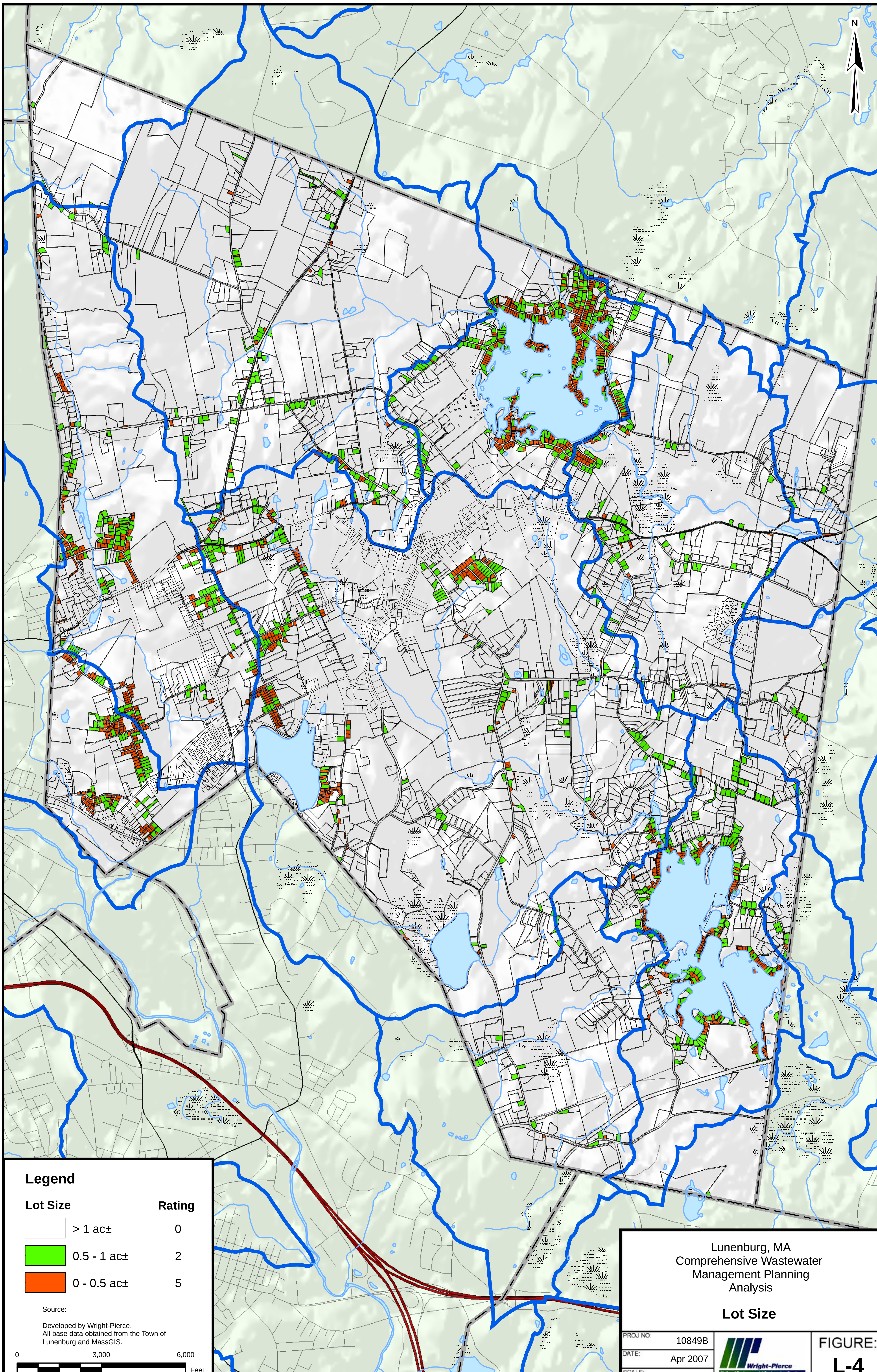
Tier 2
Public Health
Perc Rate
Slope
System Age
Depth to Groundwater at Inspection
Water Supply Protection
High Water Use
Protection of Surface Waters
Surface Water Quality
Nutrients
Preserving Community Character
Visual Analysis
Managed Growth
Development of Adjacent Land
Agricultural Lands

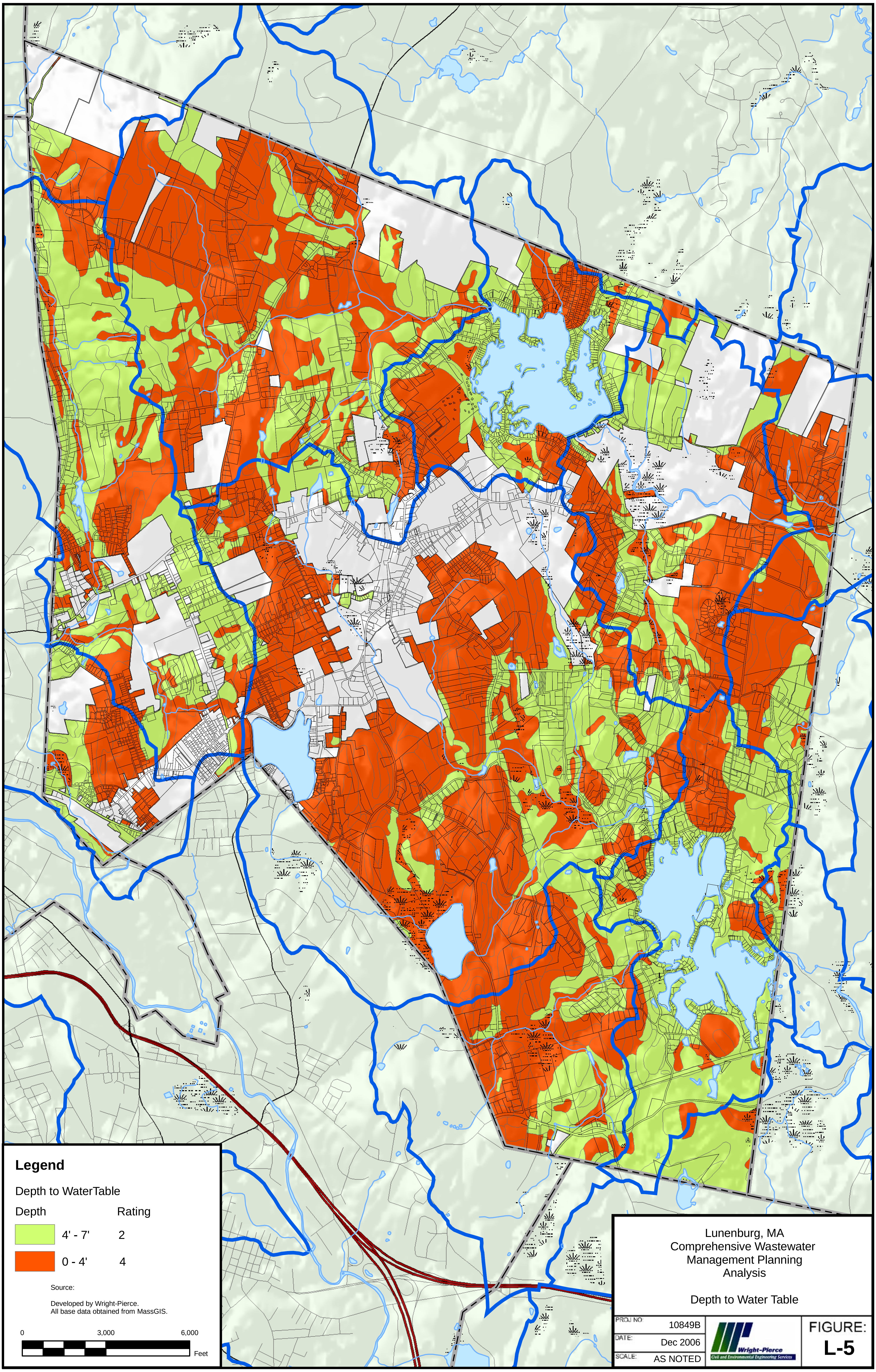
APPENDIX L
Ranking Layers Figures


N
Legend
Title 5 System Inspections
Description of Inspections
Rating
Rating
0
Pass 0
Further Evaluation 0
Conditional Pass 0
Title 5 Systems Variances
Description of Variances
Rating
Rating
2
3
4
5
Reduced Well Offset to Septic System 5
Reduction of Soil Depth 4
Reduced Groundwater Offset 3
Sieve Analysis 2
Reduced Offset Septic to Wetland 2
Well Variance 0
Local Variance 0
Title 5 Setback 0
Title 5 Systems Failures
Description of Failures
Rating
Rating
0
4
5
8
9
10
13
14
15
18
20
Public Health 0
Backup 4
Breakout 5
Clogged 4
Pumped > 4 x per yr 5
Below Groundwater 5
Withing 100' of surface water supply 0
Within Zone I 0
Within 50' of private well 5
Within 50-100' of private well 4
Source:
Developed by Wright-Pierce.
All base data obtained from the Town of Lunenburg and MassGIS.
0 3,000 6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Title 5 Systems
PROJ NO: 10849B
DATE: Apr 2007
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-1

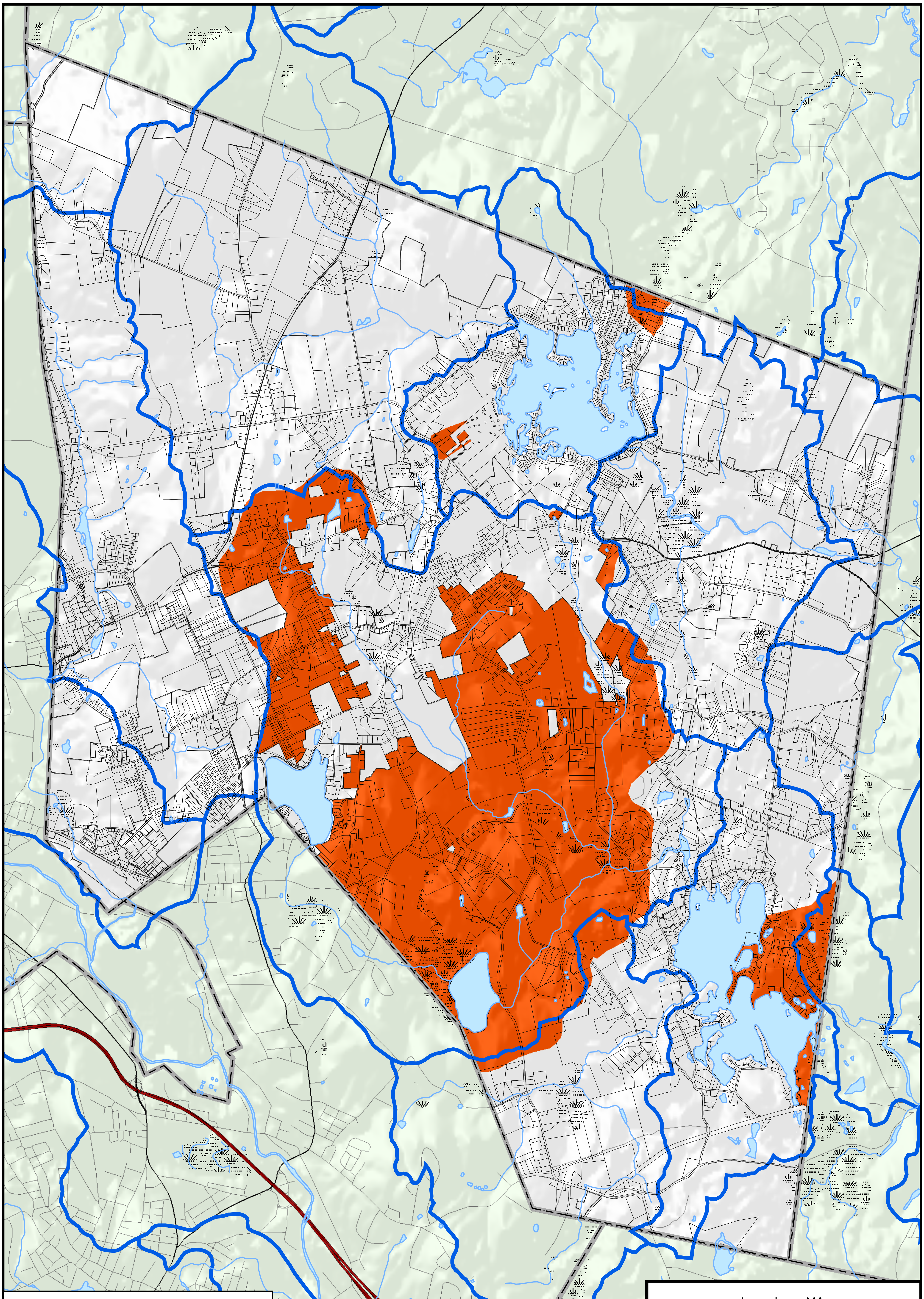

Legend
SoilsDrainage
Rating
Well Drained 0
Moderately Well Drained 1
Excavated Materials
Pits, Gravel and Quarry 2
Somewhat excessively drained
Poorly Drained 3
Excessively Drained
Urban Land 4
Very Poorly Drained 5
Source:
Developed by Wright-Pierce.
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Soil Drainage Class
PROJ NO: 10849B
DATE: Dec 2006
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-2


Legend
Depth to Bedrock
<100 cm Rating = 5
>100 cm but <200 cm Rating = 2
>200 cm Rating = 0
Source:
Developed by Wright-Pierce.
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Depth to Bedrock
PROJ NO: 10849B
DATE: Dec 2006
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-3


N
Legend
Lot Size
Rating
> 1 ac±
0
0.5 - 1 ac±
2
0 - 0.5 ac±
5
Source:
Developed by Wright-Pierce.
All base data obtained from the Town of Lunenburg and MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Lot Size
PROJ NO: 10849B
DATE: Apr 2007
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-4



Legend
Depth to WaterTable
Depth
Rating
4' - 7'
2
0 - 4'
4
Source:
Developed by Wright-Pierce.
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Depth to Water Table
PROJ NO: 10849B
DATE: Dec 2006
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-5



Legend

Water Resource Protection District Rating = 3

Source:

Developed by Wright-Pierce.
All base data obtained from MassGIS.

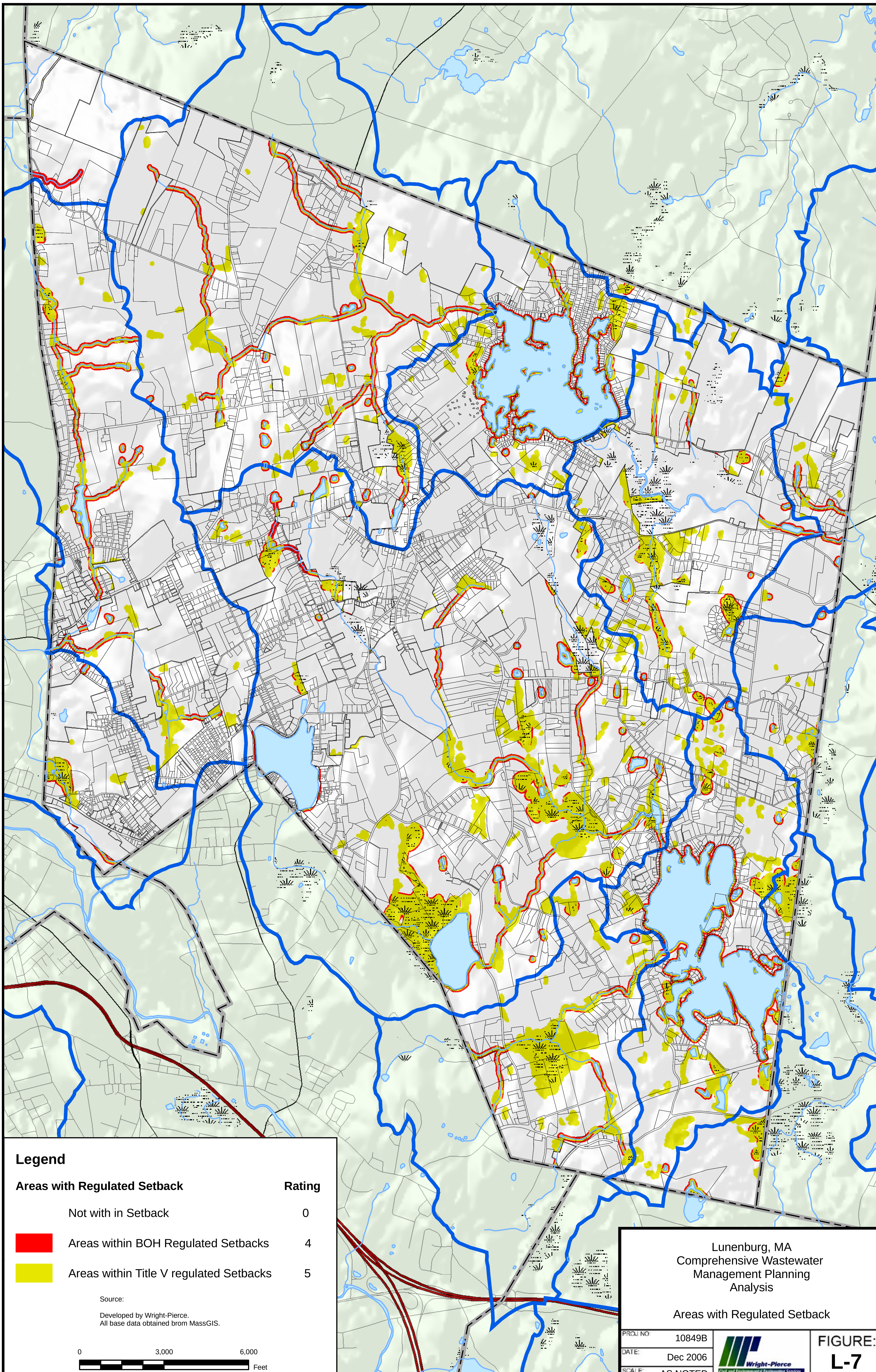
0 3,000 6,000 Feet

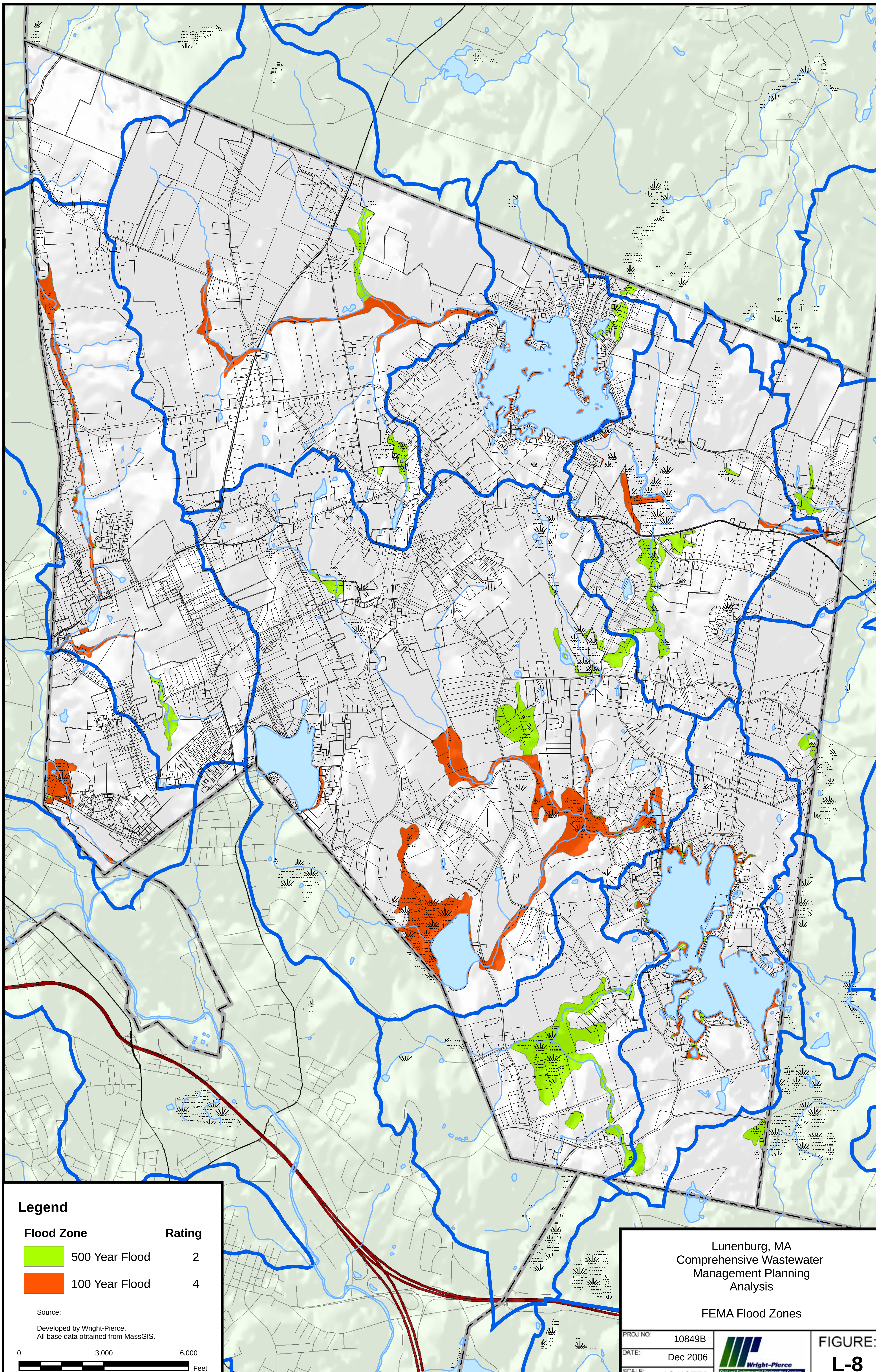
Lunenburg, MA
Comprehensive Wastewater Management Planning Analysis

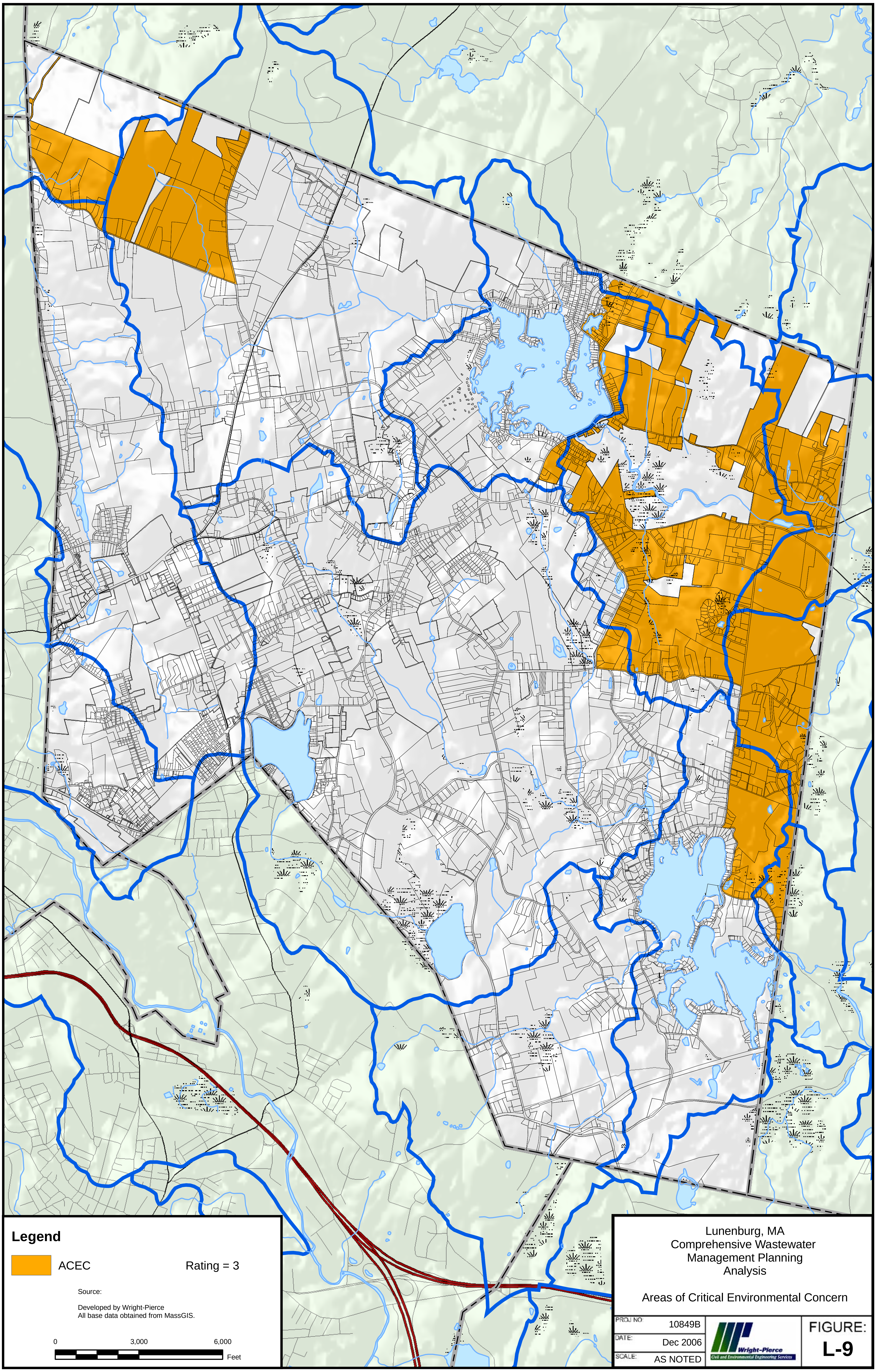
Water Resource Protection District

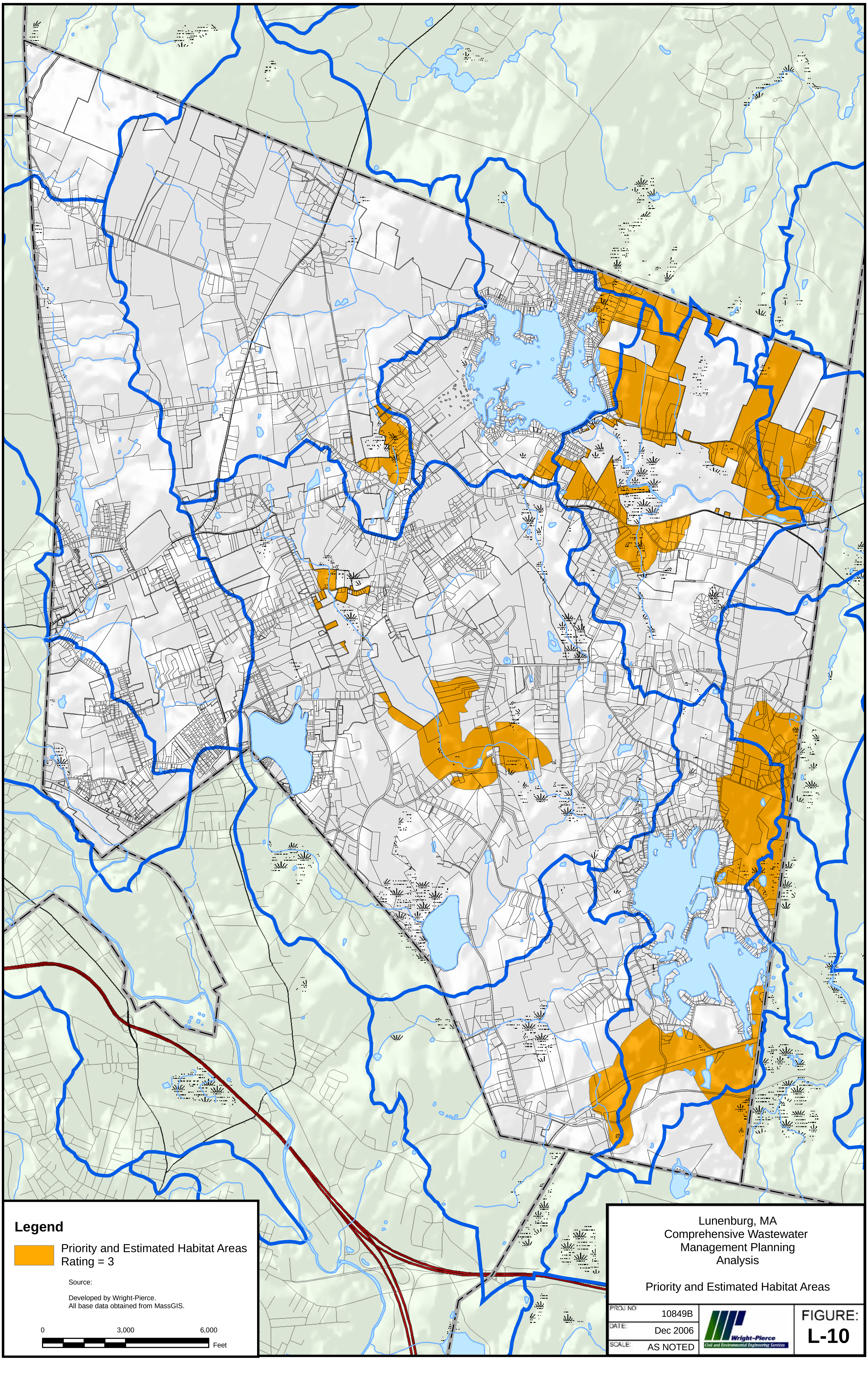
PROJ NO:	10849B	FIGURE: L-6
DATE:	Dec 2006	
SCALE:	AS NOTED	

Wright-Pierce
Civil and Environmental Engineering Services


Legend
Areas with Regulated Setback
Rating
Not with in Setback
0
Areas within BOH Regulated Setbacks
4
Areas within Title V regulated Setbacks
5
Source:
Developed by Wright-Pierce.
All base data obtained brom MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Areas with Regulated Setback
PROJ NO:
10849B
DATE:
Dec 2006
SCALE:
AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-7


Legend
Flood Zone
Rating
500 Year Flood
2
100 Year Flood
4
Source:
Developed by Wright-Pierce.
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
FEMA Flood Zones
PROJ NO: 10849B
DATE: Dec 2006
SCALE: AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-8


Legend
ACEC
Rating = 3
Source:
Developed by Wright-Pierce
All base data obtained from MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Areas of Critical Environmental Concern
PROJ NO:
10849B
DATE:
Dec 2006
SCALE:
AS NOTED
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-9



Legend

Priority and Estimated Habitat Areas Rating = 3

Source:

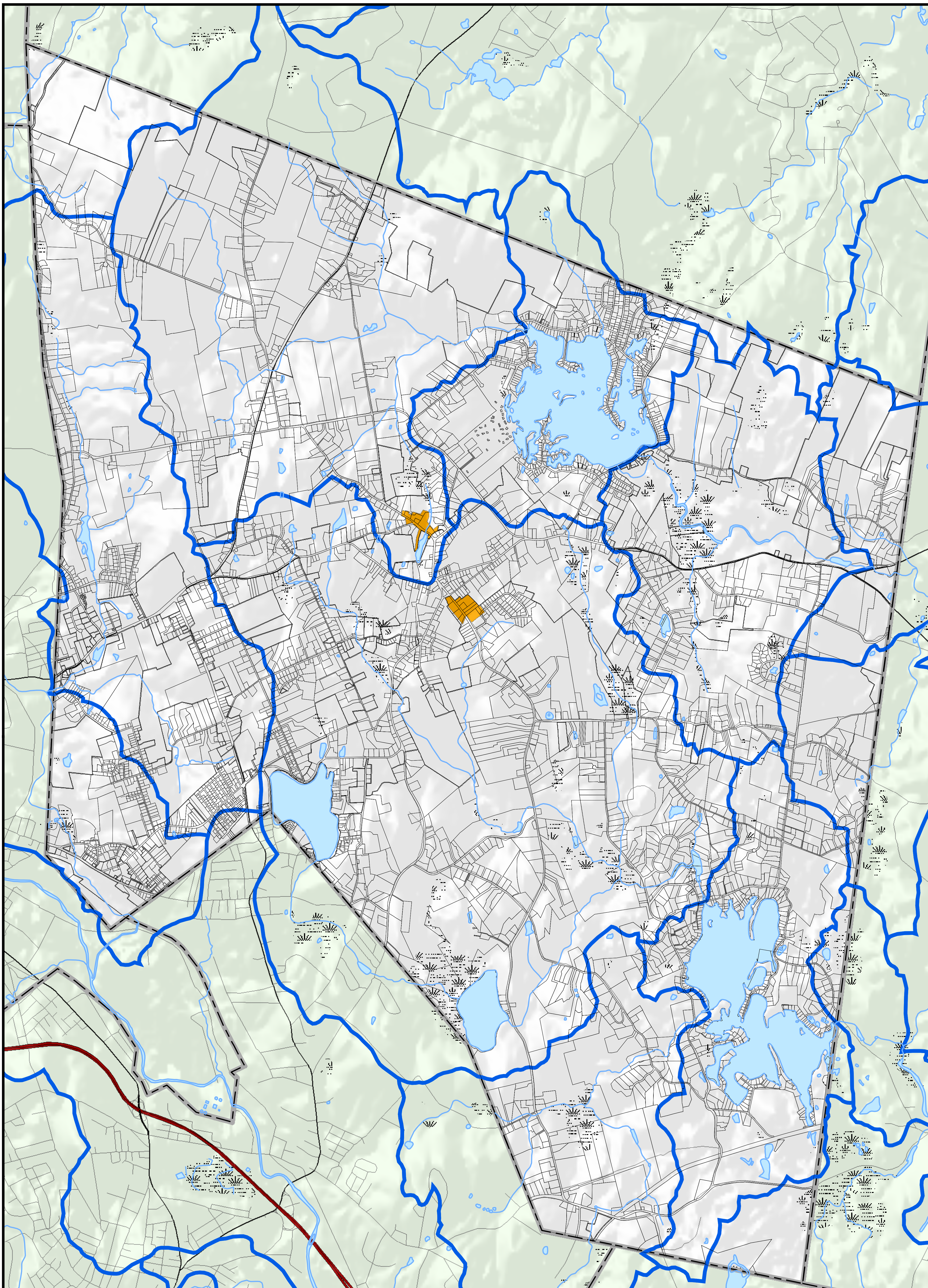
Developed by Wright-Pierce.
All base data obtained from MassGIS.

0 3,000 6,000 Feet

Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis

Priority and Estimated Habitat Areas

PROJ NO:	10849B	Wright-Pierce Civil and Environmental Engineering Services	FIGURE: L-10
DATE:	Dec 2006		
SCALE:	AS NOTED		



Legend

Historic District Rating = 3

Source:

Developed by Wright-Pierce.
All base data obtained from MassGIS.

0 3,000 6,000 Feet

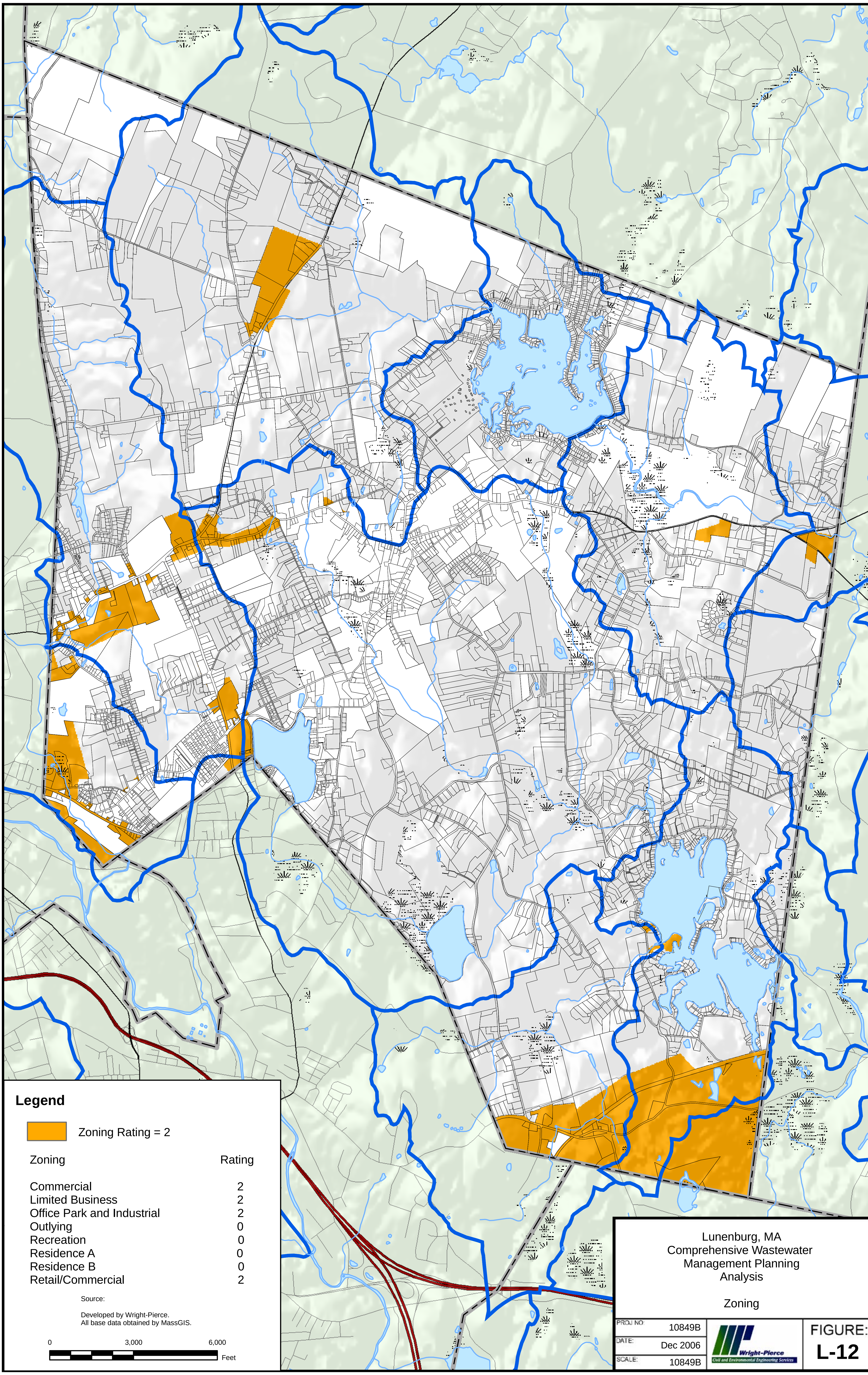
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis

Historic District

PROJ NO:	10849B
DATE:	Dec 2006
SCALE:	AS NOTED

Wright-Pierce
Civil and Environmental Engineering Services

FIGURE:
L-11


Legend
Zoning Rating = 2
Zoning
Rating
Commercial 2
Limited Business 2
Office Park and Industrial 2
Outlying 0
Recreation 0
Residence A 0
Residence B 0
Retail/Commercial 2
Source:
Developed by Wright-Pierce.
All base data obtained by MassGIS.
0
3,000
6,000
Feet
Lunenburg, MA
Comprehensive Wastewater
Management Planning
Analysis
Zoning
PROJ NO: 10849B
DATE: Dec 2006
SCALE: 10849B
Wright-Pierce
Civil and Environmental Engineering Services
FIGURE:
L-12

APPENDIX M
Soil Drainage Classifications

APPENDIX M

SOIL TYPES AND DRAINAGE CLASS

SOIL TYPE	DRAINAGE CLASS
Udorthents, smoothed	Excavated Materials
Hinckley sandy loam, 0 to 3 percent slopes	Excessively drained
Hinckley sandy loam, 15 to 25 percent slopes	Excessively drained
Hinckley sandy loam, 25 to 35 percent slopes	Excessively drained
Hinckley sandy loam, 3 to 8 percent slopes	Excessively drained
Hinckley sandy loam, 8 to 15 percent slopes	Excessively drained
Quonset loamy sand, 0 to 3 percent slopes	Excessively drained
Quonset loamy sand, 15 to 25 percent slopes	Excessively drained
Quonset loamy sand, 3 to 8 percent slopes	Excessively drained
Quonset loamy sand, 8 to 15 percent slopes	Excessively drained
Windsor loamy fine sand, 0 to 3 percent slopes	Excessively drained
Windsor loamy fine sand, 15 to 25 percent slopes	Excessively drained
Windsor loamy fine sand, 3 to 8 percent slopes	Excessively drained
Windsor loamy fine sand, 8 to 15 percent slopes	Excessively drained
Amostown and Belgrade soils, 3 to 8 percent slopes	Moderately well drained
Deerfield sandy loam, 0 to 3 percent slopes	Moderately well drained
Sudbury fine sandy loam, 0 to 3 percent slopes	Moderately well drained
Sudbury fine sandy loam, 3 to 8 percent slopes	Moderately well drained
Winooski very fine sandy loam, 0 to 3 percent slopes	Moderately well drained
Woodbridge fine sandy loam, 0 to 3 percent slopes	Moderately well drained
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	Moderately well drained
Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	Moderately well drained
Woodbridge fine sandy loam, 3 to 8 percent slopes	Moderately well drained
Woodbridge fine sandy loam, 8 to 15 percent slopes	Moderately well drained
Woodbridge fine sandy loam, 8 to 15 percent slopes, extremely stony	Moderately well drained
Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	Moderately well drained
Pits, gravel	Pits, Gravel & Quarry
Pits, quarry	Pits, Gravel & Quarry

SOIL TYPE	DRAINAGE CLASS
Limerick silt loam, 0 to 3 percent slopes	Poorly drained
Raynham silt loam, 0 to 3 percent slopes	Poorly drained
Ridgebury fine sandy loam, 0 to 3 percent slopes	Poorly drained
Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	Poorly drained
Ridgebury fine sandy loam, 3 to 8 percent slopes	Poorly drained
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	Poorly drained
Walpole fine sandy loam, 0 to 3 percent slopes	Poorly drained
Merrimac fine sandy loam, 3 to 8 percent slopes	Somewhat excessively drained
Urban land	Urban Land
Freetown muck, 0 to 1 percent slopes	Very poorly drained
Freetown muck, ponded, 0 to 1 percent slopes	Very poorly drained
Saco silt loam, 0 to 3 percent slopes	Very poorly drained
Scarboro mucky fine sandy loam, 0 to 3 percent slopes	Very poorly drained
Swansea muck, 0 to 1 percent slopes	Very poorly drained
Whitman loam, 0 to 3 percent slopes	Very poorly drained
Whitman loam, 0 to 3 percent slopes, extremely stony	Very poorly drained
Water	Water
Agawam fine sandy loam, 8 to 15 percent slopes	Well drained
Canton fine sandy loam, 15 to 25 percent slopes, extremely stony	Well drained
Canton fine sandy loam, 3 to 8 percent slopes	Well drained
Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	Well drained
Canton fine sandy loam, 3 to 8 percent slopes, very stony	Well drained
Canton fine sandy loam, 8 to 15 percent slopes	Well drained
Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	Well drained
Canton fine sandy loam, 8 to 15 percent slopes, very stony	Well drained
Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	Well drained
Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	Well drained
Paxton-Urban land complex, 8 to 15 percent slopes	Well drained
Paxton fine sandy loam, 15 to 25 percent slopes	Well drained
Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	Well drained
Paxton fine sandy loam, 15 to 25 percent slopes, very stony	Well drained

SOIL TYPE	DRAINAGE CLASS
Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony	Well drained
Paxton fine sandy loam, 3 to 8 percent slopes	Well drained
Paxton fine sandy loam, 3 to 8 percent slopes, extremely stony	Well drained
Paxton fine sandy loam, 3 to 8 percent slopes, very stony	Well drained
Paxton fine sandy loam, 8 to 15 percent slopes	Well drained
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	Well drained
Paxton fine sandy loam, 8 to 15 percent slopes, very stony	Well drained
Poquonock loamy sand, 3 to 8 percent slopes	Well drained
Poquonock loamy sand, 3 to 8 percent slopes, very stony	Well drained
Poquonock loamy sand, 8 to 15 percent slopes	Well drained

APPENDIX N
Ranking Layer Calcultions

TOWN OF LUNENBURG
CWMP PHASE 1
TIER 1
TITLE 5 INSPECTION

Study Area	Conditional Score	Variance Score	Failed Score		Total Title 5 Inspection Score	% score		Area (acres)	% area		Title 5 Systems Ranking Layer (% score/ % area)
	A	B	C		D = A + B + C	E = Percent of the Total Title 5 Inspection Score (D)		F = Acres of Land in Study Area	G = Percent of Total Land Area (F)		Score = E/G
1	0	0	0		0	0.00%		156.91	1.17%		0.00
2	0	5	0		5	0.47%		550.24	4.11%		0.11
3	0	3	0		3	0.28%		383.94	2.87%		0.10
4	0	9	65		74	6.91%		154.38	1.15%		5.99
5	0	0	0		0	0.00%		18.28	0.14%		0.00
6	0	27	54		81	7.56%		277.28	2.07%		3.65
7	0	3	0		3	0.28%		162.96	1.22%		0.23
8	0	0	5		5	0.47%		102.31	0.76%		0.61
9	0	30	139		169	15.78%		361.11	2.70%		5.85
10	0	12	40		52	4.86%		235.28	1.76%		2.76
11	0	61	67		128	11.95%		2415.96	18.04%		0.66
12	0	22	21		43	4.01%		242.41	1.81%		2.22
13	0	6	0		6	0.56%		187.10	1.40%		0.40
14	0	46	126		172	16.06%		773.58	5.78%		2.78
15	0	9	31		40	3.73%		134.37	1.00%		3.72
16	0	25	34		59	5.51%		1654.52	12.36%		0.45
17	0	11	0		11	1.03%		753.48	5.63%		0.18
18	0	0	0		0	0.00%		691.60	5.17%		0.00
19	0	59	61		120	11.20%		1295.26	9.67%		1.16
20	0	12	40		52	4.86%		1075.78	8.03%		0.60
21	0	0	0		0	0.00%		496.88	3.71%		0.00
22	0	6	42		48	4.48%		625.70	4.67%		0.96
23	0	0	0		0	0.00%		566.98	4.23%		0.00
24	0	0	0		0	0.00%		73.19	0.55%		0.00
Total					**1071**	**100.00%**		**13389.49**	**100.00%**		

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

SOILS / DRAINAGE CLASS

TABLE 2-2

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	20.22%	0.00	
	1	63.21%	0.63	
	3	0.34%	0.01	
	4	15.86%	0.63	
	5	0.37%	0.02	1.30
2	0	67.07%	0.00	
	1	16.49%	0.16	
	3	6.19%	0.19	
	4	3.83%	0.15	
	5	6.42%	0.32	0.83
3	0	67.60%	0.00	
	1	4.16%	0.04	
	2	1.75%	0.04	
	3	12.29%	0.37	
	4	10.40%	0.42	
	5	3.80%	0.19	1.05
4	0	50.15%	0.00	
	1	31.47%	0.31	
	3	6.60%	0.20	
	4	10.94%	0.44	
	5	0.84%	0.04	0.99
5	2	13.18%	0.26	
	4	4.94%	0.20	
	5	81.88%	4.09	4.56
6	0	28.76%	0.00	
	1	31.83%	0.32	
	2	6.81%	0.14	
	3	9.74%	0.29	
	4	21.17%	0.85	
	5	1.70%	0.09	1.68

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

SOILS / DRAINAGE CLASS

TABLE 2-2

Study Area	Rating	% Acreage	Score	Tabulated Score
7	0	44.10%	0.00	
	1	25.01%	0.25	
	3	3.92%	0.12	
	4	5.08%	0.20	
	5	21.88%	1.09	1.67
8	0	79.17%	0.00	
	1	9.23%	0.09	
	3	11.48%	0.34	
	4	0.12%	0.00	0.44
9	0	44.74%	0.00	
	1	39.18%	0.39	
	2	0.01%	0.00	
	3	7.02%	0.21	
	4	0.57%	0.02	
	5	8.49%	0.42	1.05
10	0	57.30%	0.00	
	1	19.10%	0.19	
	2	4.28%	0.09	
	3	7.95%	0.24	
	4	4.92%	0.20	
	5	6.45%	0.32	1.04
11	0	35.92%	0.00	
	1	40.71%	0.41	
	2	0.63%	0.01	
	3	10.58%	0.32	
	4	6.65%	0.27	
	5	5.51%	0.28	1.28
12	0	55.01%	0.00	
	1	9.97%	0.10	
	3	6.83%	0.20	
	4	9.15%	0.37	
	5	19.04%	0.95	1.62

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

SOILS / DRAINAGE CLASS

TABLE 2-2

Study Area	Rating	% Acreage	Score	Tabulated Score
13	0	25.36%	0.00	
	1	54.69%	0.55	
	3	7.94%	0.24	
	4	10.58%	0.42	
	5	1.44%	0.07	1.28
14	0	53.15%	0.00	
	1	11.95%	0.12	
	2	0.13%	0.00	
	3	0.93%	0.03	
	4	30.27%	1.21	
	5	3.55%	0.18	1.54
15	0	54.05%	0.00	
	1	37.98%	0.38	
	3	7.96%	0.24	
	5	0.00%	0.00	0.62
16	0	61.32%	0.00	
	1	17.40%	0.17	
	2	0.84%	0.02	
	3	4.12%	0.12	
	4	6.41%	0.26	
	5	9.92%	0.50	1.07
17	0	30.69%	0.00	
	1	13.49%	0.13	
	2	1.79%	0.04	
	3	1.73%	0.05	
	4	31.61%	1.26	
	5	20.68%	1.03	2.52
18	0	12.78%	0.00	
	1	1.18%	0.01	
	2	49.62%	0.99	
	4	26.91%	1.08	
	5	9.51%	0.48	2.56
19	0	46.94%	0.00	
	1	4.93%	0.05	
	2	1.83%	0.04	
	4	42.08%	1.68	
	5	4.22%	0.21	1.98

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

SOILS / DRAINAGE CLASS

TABLE 2-2

Study Area	Rating	% Acreage	Score	Tabulated Score
20	0	16.24%	0.00	
	1	10.19%	0.10	
	2	3.58%	0.07	
	3	2.19%	0.07	
	4	51.88%	2.08	
	5	15.92%	0.80	3.11
21	0	34.09%	0.00	
	1	44.59%	0.45	
	3	0.82%	0.02	
	4	17.56%	0.70	
	5	2.94%	0.15	1.32
22	0	33.89%	0.00	
	1	28.97%	0.29	
	2	1.77%	0.04	
	3	1.53%	0.05	
	4	21.89%	0.88	
	5	11.94%	0.60	1.84
23	0	70.40%	0.00	
	1	11.24%	0.11	
	2	1.77%	0.04	
	3	2.53%	0.08	
	4	4.23%	0.17	
	5	9.83%	0.49	0.88
24	0	42.10%	0.00	
	1	28.03%	0.28	
	2	2.88%	0.06	
	3	1.74%	0.05	
	4	19.85%	0.79	
	5	5.39%	0.27	1.45

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

DEPTH TO BEDROCK

TABLE 2-3

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	82.84%	0.00	
	5	17.16%	0.86	0.86
2	0	48.18%	0.00	
	5	51.82%	2.59	2.59
3	0	82.29%	0.00	
	5	17.71%	0.89	0.89
4	0	63.31%	0.00	
	5	36.69%	1.83	1.84
5	0	100.00%	0.00	0.00
6	0	95.24%	0.00	
	5	4.76%	0.24	0.24
7	0	56.27%	0.00	
	5	43.73%	2.19	2.19
8	0	28.66%	0.00	
	5	71.34%	3.57	3.57
9	0	91.09%	0.00	
	5	8.91%	0.45	0.45
10	0	60.68%	0.00	
	5	39.32%	1.97	1.97
11	0	80.15%	0.00	
	5	19.85%	0.99	0.99
12	0	45.00%	0.00	
	5	55.00%	2.75	2.75
13	0	81.09%	0.00	
	5	18.91%	0.95	0.95
14	0	94.74%	0.00	
	5	5.26%	0.26	0.26
15	0	100.00%	0.00	0.00
16	0	97.29%	0.00	
	5	2.71%	0.14	0.14
17	0	99.89%	0.00	
	5	0.11%	0.01	0.01

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

DEPTH TO BEDROCK

TABLE 2-3

Study Area	Rating	% Acreage	Score	Tabulated Score
18	0	96.83%	0.00	
	5	3.17%	0.16	0.16
19	0	98.45%	0.00	
	5	1.55%	0.08	0.08
20	0	94.61%	0.00	
	5	5.39%	0.27	0.27
21	0	81.95%	0.00	
	5	18.05%	0.90	0.90
22	0	90.86%	0.00	
	5	9.14%	0.46	0.46
23	0	63.72%	0.00	
	5	36.28%	1.81	1.81
24	0	59.45%	0.00	
	5	40.55%	2.03	2.03

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

LOT SIZES

TABLE 2-4

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	97.41%	0.00	
	2	1.54%	0.03	
	5	1.05%	0.05	0.08
2	0	97.61%	0.00	
	2	1.38%	0.03	
	5	1.01%	0.05	0.08
3	0	98.79%	0.00	
	2	0.34%	0.01	
	5	0.87%	0.04	0.05
4	0	61.82%	0.00	
	2	21.82%	0.44	
	5	16.36%	0.82	1.25
5	0	99.35%	0.00	
	5	0.65%	0.03	0.03
6	0	74.84%	0.00	
	2	12.70%	0.25	
	5	12.47%	0.62	0.88
7	0	88.83%	0.00	
	2	5.00%	0.10	
	5	6.17%	0.31	0.41
8	0	78.79%	0.00	
	2	15.15%	0.30	
	5	6.06%	0.30	0.61
9	0	81.24%	0.00	
	2	9.63%	0.19	
	5	9.13%	0.46	0.65
10	0	89.00%	0.00	
	2	7.42%	0.15	
	5	3.58%	0.18	0.33
11	0	98.05%	0.00	
	2	1.65%	0.03	
	5	0.30%	0.02	0.05

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

LOT SIZES

TABLE 2-4

Study Area	Rating	% Acreage	Score	Tabulated Score
12	0	87.45%	0.00	
	2	9.82%	0.20	
	5	2.73%	0.14	0.33
13	0	91.30%	0.00	
	2	7.70%	0.15	
	5	0.99%	0.05	0.20
14	0	74.25%	0.00	
	2	13.43%	0.27	
	5	12.33%	0.62	0.89
15	0	76.20%	0.00	
	2	14.88%	0.30	
	5	8.92%	0.45	0.74
16	0	98.20%	0.00	
	2	1.50%	0.03	
	5	0.30%	0.02	0.05
17	0	98.46%	0.00	
	2	1.25%	0.03	
	5	0.28%	0.01	0.04
18	0	99.38%	0.00	
	2	0.54%	0.01	
	5	0.08%	0.00	0.02
19	0	88.24%	0.00	
	2	7.68%	0.15	
	5	4.08%	0.20	0.36
20	0	95.77%	0.00	
	2	3.26%	0.07	
	5	0.97%	0.05	0.11
21	0	98.44%	0.00	
	2	1.05%	0.02	
	5	0.52%	0.03	0.05
22	0	94.40%	0.00	
	2	4.88%	0.10	
	5	0.72%	0.04	0.13
23	0	97.55%	0.00	
	2	2.04%	0.04	
	5	0.41%	0.02	0.06
24	0	89.60%	0.00	
	2	7.21%	0.14	

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

LOT SIZES

TABLE 2-4

Study Area	Rating	% Acreage	Score	Tabulated Score
	5	3.20%	0.16	0.30

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

DEPTH TO WATER TABLE

TABLE 2-5

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	0.00%	0.00	
	2	33.09%	0.66	
	4	66.91%	2.68	3.34
2	0	0.00%	0.00	
	2	70.33%	1.41	
	4	29.67%	1.19	2.59
3	0	0.00%	0.00	
	2	61.01%	1.22	
	4	38.99%	1.56	2.78
4	0	0.00%	0.00	
	2	47.67%	0.95	
	4	52.32%	2.09	3.05
5	0	0.00%	0.00	
	2	18.12%	0.36	
	4	81.88%	3.28	3.64
6	0	0.00%	0.00	
	2	32.77%	0.66	
	4	67.23%	2.69	3.35
7	2	48.94%	0.98	
	4	51.06%	2.04	3.02
8	2	71.53%	1.43	
	4	28.47%	1.14	2.57
9	2	9.48%	0.19	
	4	90.52%	3.62	3.81
10	2	49.69%	0.99	
	4	50.31%	2.01	3.01
11	0	0.00%	0.00	
	2	35.05%	0.70	
	4	64.95%	2.60	3.30
12	2	64.16%	1.28	
	4	35.84%	1.43	2.72

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

DEPTH TO WATER TABLE

TABLE 2-5

Study Area	Rating	% Acreage	Score	Tabulated Score
13	2	29.71%	0.59	
	4	70.29%	2.81	3.41
14	2	79.32%	1.59	
	4	20.68%	0.83	2.41
15	4	100.00%	4.00	4.00
16	0	0.00%	0.00	
	2	14.16%	0.28	
	4	85.84%	3.43	3.72
17	0	0.00%	0.00	
	2	33.97%	0.68	
	4	66.03%	2.64	3.32
18	0	0.00%	0.00	
	2	81.15%	1.62	
	4	18.85%	0.75	2.38
19	0	0.00%	0.00	
	2	74.10%	1.48	
	4	25.90%	1.04	2.52
20	2	62.27%	1.25	
	4	37.73%	1.51	2.76
21	0	0.00%	0.00	
	2	35.66%	0.71	
	4	64.34%	2.57	3.29
22	2	34.28%	0.69	
	4	65.72%	2.63	3.31
23	0	0.00%	0.00	
	2	44.63%	0.89	
	4	55.36%	2.21	3.11
24	2	64.01%	1.28	
	4	35.99%	1.44	2.72

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

LUNENBURG WATER RESOURCE PROTECTION DISTRICT

TABLE 2-6

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	100.00%	0.00	0.00
2	0	100.00%	0.00	0.00
3	0	100.00%	0.00	0.00
4	0	100.00%	0.00	0.00
5	0	100.00%	0.00	0.00
6	0	100.00%	0.00	0.00
7	0	100.00%	0.00	0.00
8	0	94.74%	0.00	
	3	5.26%	0.16	0.16
9	0	2.01%	0.00	
	3	97.99%	2.94	2.94
10	0	15.56%	0.00	
	3	84.44%	2.53	2.53
11	0	99.78%	0.00	
	3	0.22%	0.01	0.01
12	0	93.61%	0.00	
	3	6.39%	0.19	0.19
13	0	89.80%	0.00	
	3	10.20%	0.31	0.31
14	0	97.64%	0.00	
	3	2.36%	0.07	0.07
15	3	100.00%	3.00	3.00
16	0	0.00%	0.00	
	3	100.00%	3.00	3.00
17	0	88.38%	0.00	
	3	11.62%	0.35	0.35
18	0	99.98%	0.00	
	3	0.02%	0.00	0.00
19	0	81.72%	0.00	
	3	18.28%	0.55	0.55

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

LUNENBURG WATER RESOURCE PROTECTION DISTRICT

TABLE 2-6

Study Area	Rating	% Acreage	Score	Tabulated Score
20	0	27.05%	0.00	
	3	72.95%	2.19	2.19
21	0	100.00%	0.00	0.00
22	0	98.49%	0.00	
	3	1.51%	0.05	0.05
23	0	100.00%	0.00	0.00
24	0	75.65%	0.00	
	3	24.35%	0.73	0.73

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

AREAS WITH REGULATED SETBACKS

TABLE 2-7

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	92.97%	0.00	
	4	6.78%	0.27	
	5	0.26%	0.01	0.28
2	0	85.58%	0.00	
	4	4.16%	0.17	
	5	10.26%	0.51	0.68
3	0	85.33%	0.00	
	4	3.80%	0.15	
	5	10.87%	0.54	0.70
4	0	92.96%	0.00	
	4	1.70%	0.07	
	5	5.34%	0.27	0.34
5	0	8.16%	0.00	
	4	2.70%	0.11	
	5	89.14%	4.46	4.57
6	0	90.50%	0.00	
	4	2.79%	0.11	
	5	6.71%	0.34	0.45
7	0	75.33%	0.00	
	4	2.62%	0.10	
	5	22.05%	1.10	1.21
8	0	98.87%	0.00	
	5	1.13%	0.06	0.06
9	0	90.41%	0.00	
	4	2.91%	0.12	
	5	6.67%	0.33	0.45
10	0	84.06%	0.00	
	4	3.87%	0.15	
	5	12.07%	0.60	0.76
11	0	87.11%	0.00	
	4	3.03%	0.12	
	5	9.86%	0.49	0.61

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

AREAS WITH REGULATED SETBACKS

TABLE 2-7

Study Area	Rating	% Acreage	Score	Tabulated Score
12	0	75.69%	0.00	
	4	5.43%	0.22	
	5	18.89%	0.94	1.16
13	0	97.22%	0.00	
	4	0.30%	0.01	
	5	2.48%	0.12	0.14
14	0	38.98%	0.00	
	4	5.59%	0.22	
	5	55.43%	2.77	3.00
15	0	86.83%	0.00	
	4	2.87%	0.11	
	5	10.30%	0.51	0.63
16	0	78.47%	0.00	
	4	1.85%	0.07	
	5	19.68%	0.98	1.06
17	0	73.80%	0.00	
	4	2.26%	0.09	
	5	23.94%	1.20	1.29
18	0	78.86%	0.00	
	4	1.70%	0.07	
	5	19.44%	0.97	1.04
19	0	52.00%	0.00	
	4	4.87%	0.19	
	5	43.12%	2.16	2.35
20	0	68.63%	0.00	
	4	3.76%	0.15	
	5	27.60%	1.38	1.53
21	0	93.56%	0.00	
	4	0.52%	0.02	
	5	5.92%	0.30	0.32
22	0	79.91%	0.00	
	4	1.39%	0.06	
	5	18.71%	0.94	0.99
23	0	81.12%	0.00	
	4	3.95%	0.16	
	5	14.92%	0.75	0.90
24	0	80.71%	0.00	
	4	1.01%	0.04	

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

AREAS WITH REGULATED SETBACKS

TABLE 2-7

Study Area	Rating	% Acreage	Score	Tabulated Score
	5	18.27%	0.91	0.95

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

FLOODPLAINS

TABLE 2-8

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	99.91%	0.00	
	4	0.09%	0.00	0.00
2	0	94.81%	0.00	
	2	0.31%	0.01	
	4	4.88%	0.20	0.20
3	0	93.51%	0.00	
	2	0.47%	0.01	
	4	6.02%	0.24	0.25
4	0	98.40%	0.00	
	2	0.22%	0.00	
	4	1.38%	0.06	0.06
5	0	2.04%	0.00	
	4	97.97%	3.92	3.92
6	0	96.60%	0.00	
	2	0.03%	0.00	
	4	3.37%	0.13	0.14
7	0	90.50%	0.00	
	2	9.50%	0.19	0.19
8	0	100.00%	0.00	0.00
9	0	98.63%	0.00	
	2	0.46%	0.01	
	4	0.91%	0.04	0.05
10	0	100.00%	0.00	0.00
11	0	96.21%	0.00	
	2	0.89%	0.02	
	4	2.90%	0.12	0.13
12	0	94.25%	0.00	
	2	5.75%	0.11	0.12
13	0	100.00%	0.00	
	4	0.00%	0.00	0.00
14	0	57.76%	0.00	
	2	2.19%	0.04	
	4	40.05%	1.60	1.65
15	0	100.00%	0.00	0.00
16	0	85.44%	0.00	
	2	0.39%	0.01	
	4	14.17%	0.57	0.58

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

FLOODPLAINS

TABLE 2-8

Study Area	Rating	% Acreage	Score	Tabulated Score
17	0	81.74%	0.00	
	2	18.16%	0.36	
	4	0.10%	0.00	0.37
18	0	94.13%	0.00	
	2	5.87%	0.12	0.12
19	0	66.60%	0.00	
	2	0.94%	0.02	
	4	32.46%	1.30	1.32
20	0	80.85%	0.00	
	2	6.32%	0.13	
	4	12.83%	0.51	0.64
21	0	98.03%	0.00	
	2	1.97%	0.04	0.04
22	0	90.88%	0.00	
	2	6.40%	0.13	
	4	2.72%	0.11	0.24
23	0	94.87%	0.00	
	2	2.50%	0.05	
	4	2.63%	0.11	0.16
24	0	94.99%	0.00	
	2	5.01%	0.10	0.10

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

TABLE 2-9

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	4.66%	0.00	
	3	95.34%	2.86	2.86
2	0	97.04%	0.00	
	3	2.96%	0.09	0.09
3	0	100.00%	0.00	0.00
4	0	100.00%	0.00	0.00
5	0	100.00%	0.00	0.00
6	0	100.00%	0.00	0.00
7	0	100.00%	0.00	0.00
8	0	100.00%	0.00	0.00
9	0	100.00%	0.00	0.00
10	0	100.00%	0.00	0.00
11	0	82.82%	0.00	
	3	17.18%	0.52	0.52
12	0	100.00%	0.00	0.00
13	0	100.00%	0.00	0.00
14	0	81.99%	0.00	
	3	18.01%	0.54	0.54
15	0	100.00%	0.00	0.00
16	0	100.00%	0.00	0.00
17	0	100.00%	0.00	0.00
18	0	100.00%	0.00	0.00
19	0	83.85%	0.00	
	3	16.15%	0.48	0.48
20	0	96.51%	0.00	
	3	3.49%	0.10	0.11
21	0	2.06%	0.00	
	3	97.94%	2.94	2.94
22	0	21.38%	0.00	
	3	78.62%	2.36	2.36
23	0	0.27%	0.00	
	3	99.73%	2.99	2.99
24	0	15.84%	0.00	
	3	84.16%	2.52	2.53

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

PRIORITY / ESTIMATED HABITAT AREAS

TABLE 2-10

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	100.00%	0.00	0.00
2	0	100.00%	0.00	0.00
3	0	100.00%	0.00	0.00
4	0	100.00%	0.00	0.00
5	0	100.00%	0.00	0.00
6	0	100.00%	0.00	0.00
7	0	100.00%	0.00	0.00
8	0	100.00%	0.00	0.00
9	0	98.36%	0.00	
	3	1.64%	0.05	0.05
10	0	100.00%	0.00	0.00
11	0	100.00%	0.00	0.00
12	0	76.36%	0.00	
	3	23.64%	0.71	0.71
13	0	98.66%	0.00	
	3	1.34%	0.04	0.04
14	0	88.84%	0.00	
	3	11.16%	0.33	0.34
15	0	100.00%	0.00	0.00
16	0	89.74%	0.00	
	3	10.26%	0.31	0.31
17	0	99.30%	0.00	
	3	0.70%	0.02	0.02
18	0	60.85%	0.00	
	3	39.15%	1.17	1.17
19	0	79.39%	0.00	
	3	20.61%	0.62	0.62
20	0	93.90%	0.00	
	3	6.10%	0.18	0.18
21	0	80.53%	0.00	
	3	19.47%	0.58	0.58

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

PRIORITY / ESTIMATED HABITAT AREAS

TABLE 2-10

Study Area	Rating	% Acreage	Score	Tabulated Score
22	0	80.27%	0.00	
	3	19.73%	0.59	0.59
23	0	15.44%	0.00	
	3	84.56%	2.54	2.54
24	0	10.67%	0.00	
	3	89.33%	2.68	2.68

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

HISTORIC DISTRICT

TABLE 2-11

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	100.00%	0.00	0.00
2	0	100.00%	0.00	0.00
3	0	100.00%	0.00	0.00
4	0	100.00%	0.00	0.00
5	0	100.00%	0.00	0.00
6	0	100.00%	0.00	0.00
7	0	100.00%	0.00	0.00
8	0	100.00%	0.00	0.00
9	0	100.00%	0.00	0.00
10	0	100.00%	0.00	0.00
11	0	100.00%	0.00	0.00
12	0	94.61%	0.00	
	3	5.39%	0.16	0.16
13	0	100.00%	0.00	0.00
14	0	100.00%	0.00	0.00
15	0	88.11%	0.00	
	3	11.89%	0.36	0.36
16	0	100.00%	0.00	0.00
17	0	100.00%	0.00	0.00
18	0	100.00%	0.00	0.00
19	0	100.00%	0.00	0.00
20	0	100.00%	0.00	0.00
21	0	100.00%	0.00	0.00
22	0	100.00%	0.00	0.00
23	0	100.00%	0.00	0.00
24	0	100.00%	0.00	0.00

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

ZONING

TABLE 2-12

Study Area	Rating	% Acreage	Score	Tabulated Score
1	0	100.00%	0.00	0.00
2	0	100.00%	0.00	0.00
3	0	95.13%	0.00	
	2	4.87%	0.10	0.10
4	0	91.85%	0.00	
	2	8.15%	0.16	0.16
5	2	100.00%	2.00	2.00
6	0	80.97%	0.00	
	2	19.03%	0.38	0.38
7	0	99.96%	0.00	
	2	0.04%	0.00	0.00
8	0	98.88%	0.00	
	2	1.12%	0.02	0.02
9	0	99.77%	0.00	
	2	0.23%	0.00	0.01
10	0	80.88%	0.00	
	2	19.12%	0.38	0.38
11	0	95.62%	0.00	
	2	4.38%	0.09	0.09
12	0	100.00%	0.00	0.00
13	0	100.00%	0.00	0.00
14	0	100.00%	0.00	
	2	0.00%	0.00	0.00
15	0	100.00%	0.00	0.00
16	0	100.00%	0.00	0.00
17	0	99.56%	0.00	
	2	0.44%	0.01	0.01
18	0	1.29%	0.00	
	2	98.71%	1.97	1.97
19	0	99.43%	0.00	
	2	0.57%	0.01	0.01

TOWN OF LUNENBURG
CWMP PHASE I
TIER 1
RANKING LAYER

ZONING

TABLE 2-12

Study Area	Rating	% Acreage	Score	Tabulated Score
20	0	100.00%	0.00	0.00
21	0	99.06%	0.00	
	2	0.94%	0.02	0.02
22	0	97.78%	0.00	
	2	2.22%	0.04	0.04
23	0	96.83%	0.00	
	2	3.17%	0.06	0.06
24	0	100.00%	0.00	0.00

Wright-Pierce

Civil and Environmental Engineering Services