

**Comprehensive Water Resources Management
Plan (CWRMP) – Phase 2**

Volume 1 of 5

Town of Acton, MA

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EXECUTIVE SUMMARY

The purpose of this Phase 2 CWRMP is to complete the planning process begun with the issuance of a Massachusetts Environmental Policy Act (MEPA) certificate in December 1998 for the Middle Fort Pond Brook Sewer Project. The MEPA Certificate (EOEA No. 11781) established a Special Procedure for the preparation and review of a town-wide plan.

The precursor of this report is the Phase 1 Definition of Needs report, which assessed overall environmental conditions, evaluated water resources (drinking, ground water, surface water, wastewater) quality and quantity, and identified areas in need for alternative wastewater disposal solutions in Acton. The Phase 1 report identified 15 Needs Areas.

The Phase 1 report was prepared and submitted to MEPA in 2004. The Secretary's Certificate on the Phase 1 report was issued on August 16, 2004. In it, EOEA directed Acton to continue its phased studies of town-wide wastewater facilities and comprehensive water resources planning that make up the CWRMP and to prepare an Expanded ENF to be submitted as the next phase of the state review.

The Town of Acton and Woodard & Curran have concluded that, based on the elements of the CWRMP which have adequately addressed the elements and substance of an Environmental Impact Report (EIR), including alternatives, impacts, and mitigation, an EIR is not required. This conclusion is based on the town-wide analyses and assessment of viable alternatives and their comparative environmental impacts, technical feasibility and cost.

This Phase 2 report serves as both the final report and Phase 2 assessment as stipulated in the MEPA Certificate. The report evaluates alternatives to provide a 20-year plan for water resources protection in Acton. Included in this CWRMP are an assessment of Acton's wastewater disposal needs and an evaluation of the potential structural and non-structural systems and technologies for a range of on-site, localized, centralized and decentralized solutions.

The Phase 2 report scope of work is to:

- Assess town-wide wastewater management needs to update all related plans
- Evaluate alternative solutions, wastewater techniques and technologies, costs and funding, environmental impacts, management approaches, project delivery systems and institutional arrangements.
- Pair candidate technologies/solutions with Needs Areas
- Provide a detailed Action Plan with recommended actions, costs, and scheduling based on town approved priorities
- Prepare conceptual-level designs and program outlines for the recommended plan

The Phase 2 process can be followed in detail through the content of the Citizens Advisory Committee (CAC) meeting minutes. The CAC held 8 committee meetings and 4 public information meetings, and gave 3 presentations to Town boards and 1 presentation to Town Meeting over 22 months, in addition to subcommittee meetings held to focus on specific issues such as groundwater recharge near drinking water aquifers.

The CAC was instrumental in setting priorities and selecting solutions. The Project Team and CAC recognize that water resources are interconnected within Acton and its watershed. Therefore, considerable



discussion and effort were involved in assessing the CWRMP's role in the long-term sustainability of Acton's overall watershed health.

The result is a holistic approach to management of drinking water, wastewater, stormwater, and surface and groundwater resources. The comprehensive nature of this report is due to input received from the CAC and residents, and the Town's long standing commitment to protecting its water resources, which is exemplified by the contributions from staff, Town officials, consultants, and residents to this study.

This CWRMP relates water resource health to wastewater disposal and incorporates programs focused on management of drinking water, stormwater, surface water, and groundwater as integral components of a sustainable program.

The Town's historical focus on water resources protection has generated regulations, programs, and tools that form the foundation for the CWRMP and its recommendations. Examples of this focus are the Wastewater Management Plan produced by the Health Department in 1998 and the Health Department's surface water and groundwater sampling programs.

Assessment of Alternatives

More than 80% of residents are served by individually owned and maintained onsite wastewater systems. The remainder of the town is served by a combination of a public sewer system and nine privately owned package wastewater treatment facilities. In February 2002, Acton opened the Middle Fort Pond Brook Wastewater Treatment Facility on Adams Street, a sequencing batch reactor (SBR)-style facility. The collection system includes 70,000 linear feet of sewer and 10 pump stations. The system is designed to serve almost 10% of the community, with modular expansion capability to address future needs.

From this existing basis, the CWRMP assesses alternatives for the remainder of town not served by the central sewer. The assessment process can be described as a sequence of five steps that begin with large scale issues and work towards solutions to specific needs. The Phase 1 report is comprised of Step 1 and Step 2, while the Phase 2 report consists of Step 3 through Step 5.

Step 1 – Identify Needs in Acton using data from Board of Health records, CAC input, previous reports and studies, water sampling, and local regulations and bylaws that form the basis for the analysis of the “needs”. Potential technical alternatives for wastewater collection, treatment, disposal and management are evaluated.

Step 2 – Create Needs Areas based on the technical evaluation and on “non-technical” parameters. Technical criteria include regulatory setback requirements and design parameters. The non-technical criteria process was used to verify the selection of technical Needs Areas and ensure that the community's entire needs were considered. The Project Team presented potential technological solutions to the CAC for evaluation. In-town locations for disposal facilities were identified through an evaluation similar to the needs assessment.

Step 3 – Create Needs Planning Areas by assessing the 15 Needs Area groupings developed in Phase 1. Step 3 begins the Phase 2 process. The areas were refined based on topography, underlying geology, and socio-economic boundaries such as traditional neighborhood limits and economic growth areas.

Step 4 – Finalize Criteria Ranking by assessing the criteria. The CAC agreed that technical criteria all addressed environmental concerns and are therefore of equal rank, but some “non-technical” criteria are more important than others. Priority non-technical criteria include implementability; growth, especially



economic growth in areas designated for growth; optimization of the current wastewater infrastructure and wastewater treatment facility (WWTF); and water reuse (reclaimed water use) and recharge of groundwater/aquifers. These criteria are not explicitly attached to specific areas; rather they are primary criteria for all areas.

Step 5 – Rank Needs Planning Areas by identifying the criteria most important to each Needs Planning Area (Area) and prioritizing the Areas, followed by prioritization of solutions.

Evaluation of Alternatives

The CAC considered some solutions as not applicable. Generally, connection to the existing collection system for Needs Planning Areas north of Route 2, or construction of new collection and treatment system for Needs Planning Areas adjacent to the existing collection system are considered not feasible.

Potential solutions were identified that addressed the needs criteria and resolved environmental and public health concerns. The CAC then ranked the solutions, identifying preferred solutions for each Area that reflected the community's goals for each area. The ranking was conducted through discussion and vote and reflects the technical and non-technical criteria. However, the CAC understood the balance between available solutions and the ability to implement preferred solutions. The preferred solutions may not be readily implementable because of constraints such as cost or disposal capacity. Therefore, the goal of the assessment was to present the preferred solution with a menu of alternative solutions that address the underlying needs and present a framework for the 20-year planning period.

The CAC prioritized off-site solutions because on-site solutions, including establishing special wastewater management districts, are the default solution for all the Needs Areas.

The High Priority areas ranked from highest to lowest priority are:

1. Powdermill Plaza (Area 7)
2. Spencer Road/ Tuttle/ Flint/ Mallard (Area 10)
3. West Acton Center (Area 12)
4. Indian Village (Area 13)
5. East Acton Village (Area 3)

Medium Priority areas are:

- Marshall Crossing/ Robbins Brook/ North Acton Village (Area 1)
- Brucewood Estates (Area 5)
- Maynard Border (Area 8)
- Nash/Downey Roads (Area 11)
- Flagg Hill (Area 14)

Low Priority areas are:

- Nagog Woods/ Acorn Park/ North Acton Woods (Area 2)
- Concord Road / Robbins Park (Area 4)
- Brookside Circle (Area 6)



- Heath Hen Meadow (Area 9)
- Acton Center/ Patriot's Hill (Area 15)

Potential Solutions

The Needs Assessment demonstrates a need to address wastewater disposal issues. The potential solutions derived from the Phase 1 process include a combination of the following:

- Continued reliance on onsite wastewater systems (do nothing) under the existing management framework; by definition, the “do nothing” alternative is unsuitable for the Needs Areas but may be suitable for areas outside the Needs Areas.
- Continued reliance on onsite wastewater systems but with a town-driven management system that includes expanded monitoring and stricter treatment standards
- Cluster / Satellite collection and treatment systems
- Central collection with treatment at the Adams Street wastewater treatment facility
- Public use of in-town private treatment facilities

Structural Solutions

The Phase 1 report identified four sites as potential locations for wastewater treatment and disposal systems. As part of Phase 2 the Project Team developed a scope for a preliminary hydrogeologic site evaluation of the four sites. A fieldwork program was implemented at the following sites to determine the capacity of each site to accept dispersal of water:

- Wetherbee Street / Route 2 – Service to High Priority Area 3 and Area 4
- Adams Street – Potential expansion of the Adams Street WWTF
- High Street – Potential expansion of the Adams Street WWTF
- North Acton – Potential service to Medium Priority Area 1

As we looked for viable locations for discharge we recognized the potential value of the W.R Grace property, off Independence Road, such as size, proximity, groundwater depths and soil types but ultimately did not choose to analyze the site because EPA's Record of Decision regarding the site's remediation had not yet been issued.

The most promising location, hydrogeologically, is the Wetherbee Street site, which is aligned with the East Acton Areas (Area 3 and Area 4) as an offsite alternative. However, research into the availability of the parcel uncovered a deeded legislative conservation restriction, which would return the parcel to Commonwealth control if used for purposes other than conservation. The Town will clarify the inaccessibility of the Wetherbee Street site to determine if this parcel is a nonviable alternative for East Acton, but given the restriction and local preferences to maintain the village character of East Acton, no further active evaluation is proposed for this parcel.

The potential disposal areas have drawbacks that limit the Town's options. But, each Area associated with the four dispersal locations has other viable solutions in addition to construction of a satellite treatment and disposal facility. Therefore, we do not recommend further hydrogeologic study as part of the CWRMP. We recommend that the Town clarify the inaccessibility of the Wetherbee Street site to determine if this parcel is a nonviable alternative for East Acton.



Recharge/reuse of reclaimed water was investigated by a subgroup of the CAC, the Indirect Potable Reuse Working Group. Within the context of the Acton's 20-year CWRMP, reuse of highly treated wastewater treatment plant effluent was viewed as a potentially feasible aquifer recharge method, contributing to the preservation of the hydrologic cycle. The Group suggested that further exploration of this alternative was warranted, and recommended that the first step of this further study could consist of a small scale pilot study at the Adams Street WWTF, close coordination with state and federal regulators, and study of other programs.

Extensions of the existing Middle Fort Pond Brook sewer system provide a feasible alternative to areas south of Route 2 because the system was designed with additional capacity in anticipation of future needs. The wastewater treatment facility currently has a permit to discharge 299,000 gallons per day, of which approximately 50,000 gpd is available for future connections outside of the sewer area.

The Town of Acton has entered into a design contract for the High Street Extension Project, which is expected to be constructed in summer 2006. This project is intended to allow the decommissioning of the existing treatment facility at Powdermill Plaza while servicing the remaining properties in this corner of Acton. This project will use approximately 7,000 gpd of available capacity, leaving about 43,000 gpd for future connections. A DEP Sewer Extension Permit was obtained for this new sewer connection. This new sewer connection did not represent a new ENF trigger, as it was not an expansion in the flow to a wastewater treatment and/or disposal facility by 10% of existing capacity; five or more miles in length; or, half or more miles in length outside of the right of way of existing roadways.

Non-Structural Solutions

The definition of a "Wastewater Management District" is varied according to the level of management implemented under the auspices of one of these programs across the country. Although the specifics of the individual programs may vary, the foundational principles are the same: *Greater levels of environmental and public health protection through the delineation of a specific area within which the design, construction, operation, and maintenance of onsite wastewater treatment systems will be more closely regulated.*

Acton, because of its complete reliance on decentralized wastewater systems until the late 1990s and ongoing reliance on these systems for 90% of its population today, has always worked within a Septage Management Program structure that has matured over time into its current version.

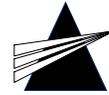
The current Septage Management structure includes:

- The permitting and installation of conventional onsite systems – defined as a system with a septic tank and a soil dispersal area – in accordance with a set of prescriptive codes,
- A function-based inspection of systems at time of property transfer,
- Required lifetime operation and maintenance (O&M) contracts with reporting and effluent sampling requirements on advanced onsite treatment technologies, and
- A regulation requiring the pumping of conventional septic tanks at least once every two years.

Recommended Plan

The recommended solutions for the Needs Planning Areas include a combination of the following:

- Continued reliance on onsite wastewater systems (do nothing) under the existing management framework for the majority of Acton;



- Continued reliance on onsite wastewater systems but with a town-driven management system that includes expanded monitoring and stricter treatment standards – this includes shared systems;
- Cluster collection and treatment systems, which can include private entities and private/public solutions;
- Expansion of the Middle Fort Pond Brook sewer system with treatment and disposal at the Adams Street treatment facility to address high priority areas and optimize the operation of system;
- Use of existing in-town private treatment facilities; and
- Continued monitoring of new technologies and opportunities over the course of the 20-year planning period for new solutions.

The current wastewater disposal system for the majority of the parcels in Acton will remain unchanged. The recommended plan is a combination of extensions of the existing sewers, cluster systems using existing private treatment systems and possible public/private solutions, shared systems between neighbors where appropriate, and the establishment of wastewater management districts. The recommended structural (sewer) solutions will not require an expansion or alteration of the existing Adams Street treatment and disposal facility.

The CWRMP's proactive public outreach program should continue following the submittal of the CWRMP and expanded ENF to keep Acton residents apprised of environmental issues such as wastewater disposal and watershed health. The program should be coordinated with other outreach efforts from the Board of Health and Acton Water District, as well as the NPDES Phase II stormwater program, which includes public participation and public outreach as minimum control measures.

Sewer Extensions:

Extensions of the existing Middle Fort Pond Brook sewer system should be prioritized to serve the following areas:

- High Street to Powdermill Plaza (Area 7),
- Spencer/Tuttle/Flint neighborhood (Area 10), and
- West Acton Center-A (Area 12) including the Gates and Douglas Schools.

The capacity of the Adams Street treatment facility's disposal beds currently limits the sewer extensions beyond these areas. The West Acton Planning Area probably will not be served in its entirety, excluding the area west of the railroad right-of-way. However, final delineation of sewer areas should be conducted during a preliminary design phase.

Cluster Systems:

The following Needs Planning Areas have existing private systems that could possibly be tapped for municipal use:

- Marshall Crossing / Robbins Brook (Area 1)
- Nagog Woods/ Acorn Park / North Acton Woods (Area 2)
- East Acton Village (Area 3)
- Brookside Circle (Area 6)
- Nash and Downey neighborhood and Dover Heights (Area 11)



The private treatment facilities in Area 1, Area 2 and Area 3 all have under-utilized capacity that should be investigated for potential private/public partnerships. Regardless of the private systems' status, cluster/neighborhood systems should be utilized where capacity is available in the High Priority Area 3 (East Acton Village). Tapping the private facilities can be combined with smaller shared systems and advanced onsite treatment systems to provide economic growth opportunity while maintaining the village character.

The focus of the Brookside Circle (Area 6) area should be to create shared systems in addition to keeping the existing treatment facility in service.

Capacity limits in the Middle Fort Pond Brook sewer system preclude the connection of the Nash and Downey neighborhood and Dover Heights (Area 11). The Dover Heights wastewater (septic) system exceeds regulatory limits for discharge capacity, which will require an upgrade to a treatment facility. This opportunity should be evaluated for a public-private solution in the neighborhood in addition to other shared and advanced system solutions.

Wastewater Management Districts:

The foundation for Wastewater Management Districts exists in the Town's septage management program. However, the final management program is dependent on input and commitment from local residents. A considerable public education and participation program should be implemented in each proposed District. Stakeholders should be identified and involved in the program through advisory committees, program review groups, and other volunteer opportunities. If stakeholders are brought into the process to provide insight and diverse views, the program will benefit and stakeholders often feel ownership of the results.

We recommend Wastewater Management Districts for the following Needs Planning Areas:

- Robbins Park (Area 4)
- Brucewood Estates (Area 5)
- Maynard Border (Area 8)
- Heath Hen Meadow (Area 9)
- West Acton Center-B (Area 12), west of the railroad right-of-way
- Indian Village (Area 13)
- Flagg Hill (Area 14)
- Acton Center (Area 15)

Financing and Costs

In implementing its first sewer infrastructure in 2002 Acton used progressive measures to finance the project. These measures were enacted to ensure sustainability of the proposed project, as well as any future projects. All of these measures were successfully implemented during construction of the first sewer infrastructure.

As the Town moves forward, it faces two hurdles in constructing additional sewer infrastructure. The first is identifying a revenue source that could be used as a cash flow device to finance the project prior to betterments being issued to the expansion area.

The second hurdle is an anomaly within the State betterment legislation. This legislation allows Towns to assess betterments by frontage, area, or use. In charging by frontage or area the legislation allows for



betterments to be redistributed when a system is expanded (in that way the new users pay for fixed costs like the treatment system construction). Unfortunately the user method is not provided that provision. In order to address this, the Town has submitted legislation that will allow all three methods of assessment the same mechanism to redistribute betterments.

The Engineer's opinion of conceptual-level costs for design and construction of the sewers to the West Acton Center-A area and Spencer/Tuttle/Flint area is between \$8.0 million and \$9.0 million (in 2006 dollars) depending on the extent of the sewered area, sewer configuration, and construction schedule. With 30-year O&M (life cycle) costs included, the present worth of the sewer extension is estimated to be between \$9.0 million and \$10.0 million.

The Engineer's opinion of conceptual-level costs to implement EPA level 4 Wastewater Management Districts and sustain the districts for 30 years is \$12.0 million to \$13.5 million in present worth dollars. This includes active management of the program by town staff and subcontractor services for tank pumping and inspections.

The Town will be well served by the flexibility of the Septage Management Enterprise Fund. As has been done in the past, costs for every aspect of any management plan will be identified and charged to beneficiaries of the service. This would allow the Town to, in the most extreme, hire a consultant to inspect Innovative/ Alternative systems and charge the homeowner for that service or to allow the homeowner to hire the consultant and pay a minimal fee that would cover oversight costs by the Town.

Environmental Impacts of the Recommended Plan

The Recommended Plan is comprised of non-structural, private, and public structural solutions that will benefit the overall environmental health of Acton's water resources and reduce risks to public health. The recommended structural solution, extending sewers to the Spencer/Tuttle/Flint area and West Acton Center-A, will have some temporary construction impacts from noise, dust, and traffic due to general excavation activities. However, new NPDES Phase II requirements to regulate construction site runoff are directed at mitigating short-term and long-term impacts of construction.

The recommended plan takes measures to minimize the environmental impact of construction activity through design, such as minimizing cross-country excavations and locating pump stations and other infrastructure away from resource areas, and during construction, such as requiring hay bales and silt fences to control runoff impacts.

The recommended plan does not require additional disposal area or treatment facility construction. The Adams Street WWTF does not need alterations or expansion to accept and adequately treat and dispose of the wastewater. However, the recommended sewerage towards West Acton Center would require filing an Environmental Notification Form with MEPA prior to construction.

Recommendations for use of cluster systems focus on use of the existing private facilities that are underutilized or require upgrade in the near future. Using these facilities would result in better treatment of wastewater in the immediate area of these facilities.

Implementation of greater levels of onsite wastewater management through Wastewater Management Districts is an environmental benefit. Acton has a unique opportunity to evaluate the effectiveness of wastewater management districts, and the overall Recommended Plan, in protecting valuable water resources using the Health Department's surface water quality surveillance program of 50 sites across the community's surface water network.



1. INTRODUCTION / BACKGROUND

1.1 PURPOSE AND SCOPE

The Town of Acton is financing this project under the state's SRF loan program pursuant to Chapters 21 and 29C of the General Laws of the Commonwealth. The loan (SRF-478) is from funds established through bonding authority of the Massachusetts Water Pollution Abatement Trust and administered by the DEP.

Acton is a suburban community approximately 25 miles northwest of Boston, and straddles Route 2, which is a major commuting corridor. Figure 1-1 depicts the geographic location of the Town.

Figure 1-1: Location of Acton, MA



The purpose of this Phase 2 CWRMP is to complete the planning process begun with the issuance of a Massachusetts Environmental Policy Act (MEPA) certificate in December 1998 for the Middle Fort Pond Brook Sewer Project. The MEPA Certificate (EOEA No. 11781) established a Special Procedure for the preparation and review of a town-wide plan. (See Appendix A)

The planning process continued through the Phase 1 Definition of Needs report. This Phase 2 report evaluates alternatives to provide a 20-year plan for water resources protection in the Town of Acton. Included in this CWRMP are an assessment of Acton's wastewater disposal needs and an evaluation of the potential structural and non-structural systems and technologies for a range of onsite, localized, centralized and decentralized solutions.



1.2 OVERVIEW OF THE PHASE 2 CWRMP PROCESS

The CWRMP process began with a Plan of Study that resulted in a DEP-approved scope of work generally following the DEP's "Guide to Comprehensive Wastewater Management Planning" dated January 1996. The process includes an evaluation of drinking water, stormwater, surface water and groundwater, but with a focus on assessing and improving wastewater disposal to protect the Town's water resources.

The Phase 1 report was prepared and submitted to MEPA in 2004. The Phase 1 report addressed needs, water demand projections and impacts to water supply, stormwater management systems, a determination of wastewater system needs prioritized by areas, and potential locations and treatment system options for onsite, expanded central and satellite wastewater treatment facilities. This Phase 2 report concludes the CWRMP process and follows the Phase 1 report dated June 2004. The Secretary's Certificate on the Phase 1 report was issued on August 16, 2004. In it, EOEА directed Acton to continue its phased studies of town-wide wastewater facilities and comprehensive water resources planning that make up the CWRMP and to prepare an Expanded ENF to be submitted as the next phase of the state review. Appendix A contains the Secretary's Certificate and the comments received during the public comment period for the Phase 1 report.

The Project Team has concluded that the CWRMP is complete and ready for DEP review and approval; and that an Environmental Impact Report is not required. This conclusion is based on the town-wide analyses and assessment of viable alternatives and their comparative environmental impacts, technical feasibility and cost. The recommended plan does not trigger review thresholds under 301 CMR 11.00. This approach has been discussed with the DEP CERO and Boston offices who agree with the findings and conclusion that an EIR is not required. Alternately, if EOEА believes that additional questions and comments on the CWRMP remain to be answered, we respectfully request that a single EIR only requiring responses to the questions submitted, be determined as adequate to address any remaining matters.

The Phase 2 report scope of work is to:

- Assess potential disposal site locations
- Evaluate wastewater techniques and technologies
- Pair candidate technologies/solutions with Needs Areas to create a recommended plan
- Prepare conceptual-level designs and program outlines for the recommended plan

The Project Team and Citizen Advisory Committee (CAC) recognize that water resources are interconnected within Acton and its watershed. Therefore, considerable discussion and effort were involved in assessing the CWRMP's role in the long-term sustainability of Acton's overall watershed health.

The comprehensive nature of this report is due to input received from the CAC, residents at public meetings, and the Town's long standing commitment to protecting its water resources. Part of the Town's commitment is investment in tools and staffing, which is exemplified by the contributions from staff to this study. As an example, all figures contained herein, with only two exceptions, are the product of Town staff.



1.2.1 Focus on Water Resources

Maintaining sustainable water resources includes management of drinking water, stormwater, and surface and groundwater resources. A true Comprehensive Water Resources Management Plan not only relates the protection of the water resources to wastewater disposal but also looks at water resources from other perspectives.

The Town's historical focus on planning for water resources protection, not on a traditional facilities plan targeting centralized solutions, has been on the forefront of regulatory trends. An example of this focus is the Wastewater Management Plan authored by Doug Halley, the Town's Health Director, which was produced prior to the design of the Middle Fort Pond Brook sewer system.

According to the Plan, "It is the Town's goal to continue to protect its water resources by identifying potential concerns and creating regulations or management systems to address those concerns...The objective of the Wastewater Management Program is to manage all wastewater discharges comprehensively, with the goal of prolonging the life span of all onsite wastewater systems and ensuring that environmental impacts are minimized, if not eliminated." Furthermore, the Plan stressed the importance of finding solutions to failing systems and managing the Town's water resources as an interconnected system.

The report summarizes the efforts the Town and the Acton Water District have taken to protect and manage its water resources, such as:

- An Aquifer Zoning Bylaw
- Aquifer Protection Overlay Districts
- A Hazardous Materials Control Bylaw
- Board of Health Aquifer Regulations
- Acton Water District's proactive water conservation program
- A monthly sampling program for nitrate loadings and groundwater levels to protect drinking water supplies
- A quarterly surface water sampling program of over 40 locations in Acton's streams since 1982 for fecal coliform and several other parameters
- Board of Health onsite wastewater system regulations more strict than Title 5
- An onsite wastewater system management system that includes a requirement for homeowners to pump their septic tank every two years, and haulers to notify the Health Department
- A systematic computer database for all operating onsite wastewater systems.

The CWRMP began with the tenets of the Wastewater Management Plan, used the broad baseline of other regulations and programs, and assessed and refined the tools developed under previous programs. The CWRMP continues the Town's proactive efforts throughout the development of the recommended plan, highlighted by the following:

- The computer database of onsite wastewater systems was invaluable as an analysis and diagnostic tool during the needs assessment process. The CWRMP finalized the content and provided thorough analysis of the database.
- Additional sampling locations were added to the surface water sampling program due to the CWRMP investigatory process.



- The onsite wastewater system management system has combined with the surface water sampling program and the needs assessment to become the framework for Wastewater Management Districts.

This section presents several of the Town's long-term initiatives in more detail to provide insight into the comprehensive baseline provided to this CWRMP.

1.2.1.1 Water Conservation

Most Acton residents receive their water from the Acton Water District (AWD). Water demand has dropped since the Phase 1 study. Average day demand has dropped from 1.86 MGD in 2002 to 1.63 MGD in 2004 and 1.7 MGD in 2005. Maximum day demand has dropped from 2.9 MGD in 2002 to 2.6 MGD in both 2004 and 2005. The AWD attributes these reductions to conservation efforts and an assertive public outreach and education campaign.

The AWD has been actively engaged in water conservation programs for several years. These programs include public education and outreach, distribution of low flow devices, and summer water use restrictions. Specifics of these programs are included in the Phase 1 report.

Additionally, the Town believes sewer billing practices contribute to water conservation. In selecting a sewer billing method, the Town chose to use the winter (September – March) water usage figures for each property, and calculate average gallons per day value, which is used to calculate monthly sewer usage bills. The gallons per day figure is used throughout the year, until new winter water bills are issued by the AWD.

Since beginning the billing on a monthly basis, using gallons per day as the rubric against which to bill, the Town has seen that it is encouraging water conservation in single family homes within the Middle Fort Pond Brook Sewer District.

1.2.1.2 Surface Water Monitoring Program

Surface water sampling programs provide valuable data for assessing potential point and non-point sources of water pollution. Large amounts of sampling data collected over an extended period allow for a comprehensive analysis of impacts to water quality. Analyses could include correlating physical changes in the community such as industrial, commercial or residential growth to changes in water quality. Situations where extensive growth has occurred in a particular section of Town may be reflected by a continual decline in surface water quality.

Acton has always been forward thinking when it comes to assessing the health and environmental quality of the Town. In 1982, the Acton Health Department started a surface water sampling program that has lead to a valuable, ever growing database of surface water quality information.

In order to manage this system better and to correlate the results of the samples, the Town established 11 watershed districts based on the two major brooks (7 districts for the Fort Pond Brook Watershed & 4 districts for the Nashoba Brook Watershed). Sampling locations were based in accordance with those districts. Working upstream from the furthest downstream location of each brook in a district, sampling points were distributed wherever brook branches occurred or major drainage systems discharged into the brooks.



Samples from the 47 sites were initially analyzed for fecal and total coliform counts. The intent of the sampling program was to monitor for failing onsite wastewater systems. If high fecal and total coliform counts were detected at one or more of the sampling locations, additional samples could be taken to pinpoint the source of contamination. The total coliform sampling parameter was eventually discontinued, since fecal coliform provides a better indication of potential onsite wastewater system failure. Since Acton has been and still is primarily an onsite wastewater system community, a failed onsite wastewater system could result in decreased surface water quality at a particular location. Also, if multiple onsite wastewater systems cause the decline of surface water quality in a particular wastewater district, the data may indicate that a larger scale solution, such as increased treatment from each system or installing sewer in that particular area, is necessary.

The sampling program is very important to Town-wide and basin-wide wastewater initiatives, as it provides a baseline to the current and past quality of Acton's surface waters. The Town added several sampling sites based on the findings of the CWRMP. These sites will not only help with data collection on potential onsite wastewater system failures, they will also provide valuable non-point source runoff information.

Small Scale Microwatersheds (SSMW)

The Town continues to expand on its baseline surface water sampling program, developing the processes and management framework to segment the 11 original wastewater districts into microwatersheds based on sampling locations to monitor and troubleshoot microwatershed health. The microwatersheds can then be linked to wastewater management areas to provide data and potentially monitoring locations linked to the management systems.

The Small Scale Microwatershed (SSMW) Method of watershed management was developed by Acton Health Department Staff and Woodard & Curran as an innovative process to apply the sampling data to watershed health. The method applies GIS technologies to quickly identify, eliminate, and manage pollution within drainage catchments or watersheds. Rooted in GIS capabilities, the SSMW method starts with the surface water sampling locations, which overlay a parcel base map, and then adds other layers, including topography, surface water features, wetland features, and the digitized map of the municipal separate stormwater system (MS4). Once the final map is produced, the Small Scale Microwatersheds (SSMWs) can be defined by the parcels that directly impact each sampling point.

The SSMWs are not cumulative and are viewed as individual units within the overall watershed or sub-watershed. The SSMW can be defined as the drainage area impacting a particular sampling point, which enables the Town to quickly identify and resolve the direct impacts to each sampling location. The sampling points provide baseline data and a jumping off point for removing illicit connections through conventional IDDE (illicit discharge detection and elimination) programs.

1.2.1.3 Ground Water Monitoring Program

Prior to 1995, significant groundwater monitoring occurred throughout the Town primarily in relation to industrial chemical contamination. The Town recognized that monitoring of the groundwater for nitrate levels would be beneficial to monitor the impact of onsite wastewater systems. In 1995, the Town selected potential locations for groundwater monitoring wells and installed 12 monitoring wells.

As in the surface-monitoring program, the placement of the subsurface monitoring wells was based on the 11 wastewater districts. An attempt was made at placing wells down gradient of major subdivisions in



accordance with a town-wide hydrology study done by GZA in 1984. The Town installed 5 more wells in 2005, for a total of 17 monitoring wells. The wells are monitored monthly for nitrate and static water level.

1.2.1.4 Stormwater Management

The Town of Acton is a NPDES Stormwater Phase 2 community. Elements of the Phase 2 Stormwater Management Plan were integrated with the CWRMP, including components of the Illicit Discharge Detection and Elimination minimum control measure that focus on further developing the surface water sampling program.

In 2005, the Town completed a constructed wetland at the North Acton Recreation Area (NARA), which was funded through an s.319 competitive grant. The wetland treats runoff from a parking lot and wooded area prior to entering the Town's swimming pond. A large component of the wetland project is education and outreach, which includes educational kiosks at the wetland that display information related to the water cycle and Acton's place within a larger watershed.

The Health Department has sought grants through other funding programs to continue to develop its surface water monitoring program into a town-wide management plan in conjunction with the development of the Wastewater Management Districts.

1.2.1.5 Other Initiatives

To maintain a comprehensive approach during the planning process, no prospective alternative to resolution of Needs Areas was removed from further consideration until the Project Team conducted a thorough review of the alternative's feasibility and the CAC assessed and debated the merits of each alternative in relation to other alternatives. The Project Team and CAC recognize that technology improves over the 20-year planning period; therefore, the recommended plan is deliberately adaptive and flexible to accommodate new technologies and capture their benefits for Acton's overall water resources.

The CAC investigated two related issues that are undergoing regulatory re-assessment and public review, groundwater recharge and reclaimed water reuse.

Recharge

Groundwater is a valuable resource to the Town of Acton. The Town is dependent on local groundwater wells for its drinking water supply. Studies have concluded that the Assabet River baseflow has been compromised by groundwater withdrawals and infrastructure development within the Assabet watershed. And, limited opportunities exist in Acton for wastewater disposal and recharge facilities. The CAC tackled these issues and concluded a mixture of limited sewerage and decentralized solutions to recharge the Town's groundwater supply can provide benefit to each of these issues.

Reclaimed Water Use

A sub-group of the CAC was formed to explore the implications of treated wastewater disposal near drinking water supplies (indirect potable reuse). The Indirect Potable Reuse (IPR) group explored published literature and met regularly prior to presenting its findings to the CAC. The group, and subsequently the CAC, recommended further study of the issue, pending identification of emergent contaminants, technological advances and regulatory guidelines.

In a related initiative the Town collaborated with the Johns Hopkins University Center for Water and Health on a nationwide survey of pharmaceuticals and personal care products (PPCPs) in wastewater and



surface water. PPCPs are constituents of concern to the IPR group. The first phase of the national program consists of collecting samples from a network of wastewater treatment facilities and surface water locations.

1.2.2 Phase 1 CWRMP Report Summary

The Phase 1 Report included an assessment of the current environmental conditions in and around Acton. Water demand projections were estimated for the study period and impacts to present and future water supply were reviewed, including an assessment of issues such as inter-basin transfers. The report assessed current wastewater and stormwater systems and programs, and determined wastewater needs. The report provided a summation of the conclusions. The final task determined the potential site locations for the satellite wastewater treatment facilities.

To determine areas in need of wastewater disposal solutions, specific data were evaluated, including system age, repair history, septage pumping records, inspection data, variances, private well locations, parcel size, depth to groundwater and bedrock, and percolation rate. A detailed discussion of needs criteria is presented in Section 2 of this report. The files and database form the basis for the wastewater needs analysis. Key design data recorded in existing non-electronic files were digitized for this project and merged with existing BOH electronic information into a comprehensive GIS database. Soils parameters available through the Natural Resources Conservation Service (NRCS) were also incorporated.

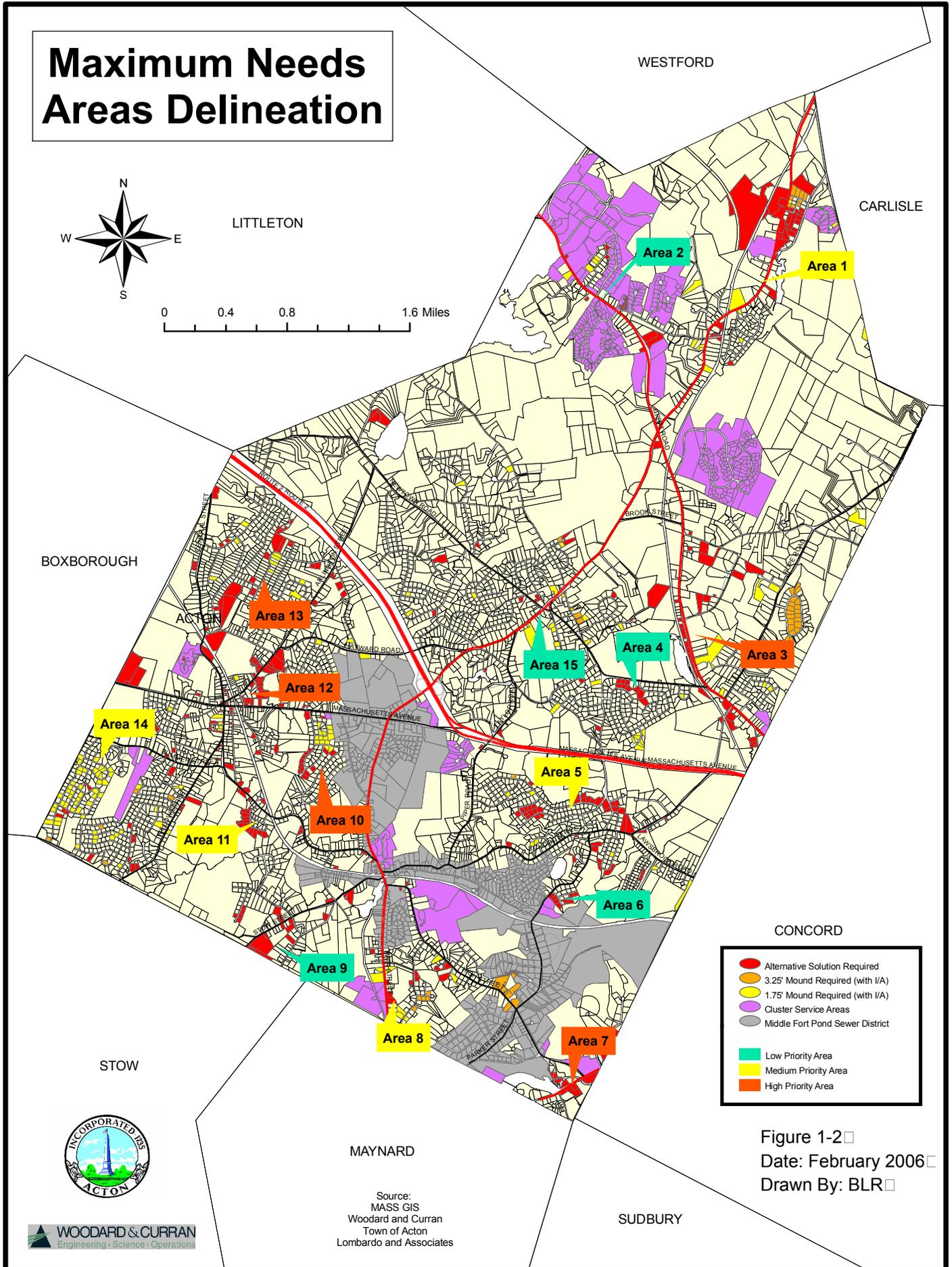
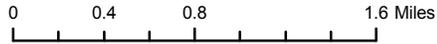
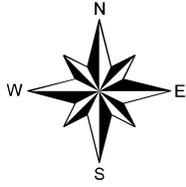
The analysis was applied town-wide, incorporating an improved and more detailed approach to identifying areas in need of wastewater solutions on a parcel basis. This process evaluates wastewater needs without presumptions or unintended bias inherent in preconfigured study areas.

Over 90% of the existing septic systems do not exhibit failure criteria under the technical evaluation conducted in Phase 1, with approximately 3.5% of the lots requiring innovative/alternative (I/A) technology and/or mounded systems. Lots identified as requiring alternative solutions to wastewater disposal problems are dispersed throughout the community. Areas where these lots are clustered are targeted for further evaluation.

Attempting to service only the dispersed lots with off-site solutions would be technically impractical and cost prohibitive. The clustered lots identified as needing alternative solutions could be joined by adjacent lots to create cohesive areas that may be more economically feasible to address. Figure 1-2 displays the maximum study areas based on combining closely grouped areas requiring alternative solutions and adjacent parcels requiring mounded systems. There are several other areas where mounded systems will most likely be required. Under Phase 2, these needs areas are further reviewed by the Project Team, with input from DEP, Town staff, CAC, and public.

The range of wastewater flows projected to be collected treated and dispersed from the proposed needs/service areas could be between 110,000 gpd and 265,000 gpd if offsite solutions are implemented for all areas. However, increased management of onsite systems and new onsite technologies should permit continued use of onsite wastewater systems for many of the areas, reducing the amount of wastewater that would be collected and treated through offsite solutions.

Maximum Needs Areas Delineation



CONCORD

- Alternative Solution Required
- 3.25' Mound Required (with I/A)
- 1.75' Mound Required (with I/A)
- Cluster Service Areas
- Middle Fort Pond Sewer District
- Low Priority Area
- Medium Priority Area
- High Priority Area





The Town, under Phase 2, will compare actual flows at the central WWTF to the design flows to maximize the facility's effectiveness and optimize the potential solutions to wastewater needs. Pending this analysis, the first needs area under consideration for extension of the existing wastewater collection system is the Powdermill Plaza area, currently served by an older treatment facility that discharges directly to the Assabet River.

Potential solutions to locating facilities and selecting appropriate technology for offsite solutions, whether decentralized/cluster facilities or expansion/extension of the existing wastewater collection and treatment system, are part of the Phase 2 process. A critical component of this evaluation is the determination of potential locations for wastewater effluent disposal within Acton.

The principal tool used in identifying areas of interest (AOI's) with potential for wastewater disposal has been the GIS databases derived from the NRCS data, the Town of Acton's GIS system, and MassGIS. These databases provide information on soil type characteristics, depth to seasonal high groundwater, depth to bedrock, level of development, and location of sensitive receptors.

Preliminary analysis of selection criteria concludes that a gross area of approximately 2,407 acres has soils suitable for locating wastewater treatment and disposal facilities. When the development criteria for eliminating unsuitable areas are applied it yields a map of AOI's as shown on Figure 1-3. On this figure potential areas for wastewater disposal have shrunk to approximately 620 acres.

The Phase 2 process will further refine this analysis by identifying the parcels that can be linked to areas in need of alternative wastewater disposal by evaluating ownership, location, and other factors such as verifying soils conditions.

1.3 PUBLIC OUTREACH

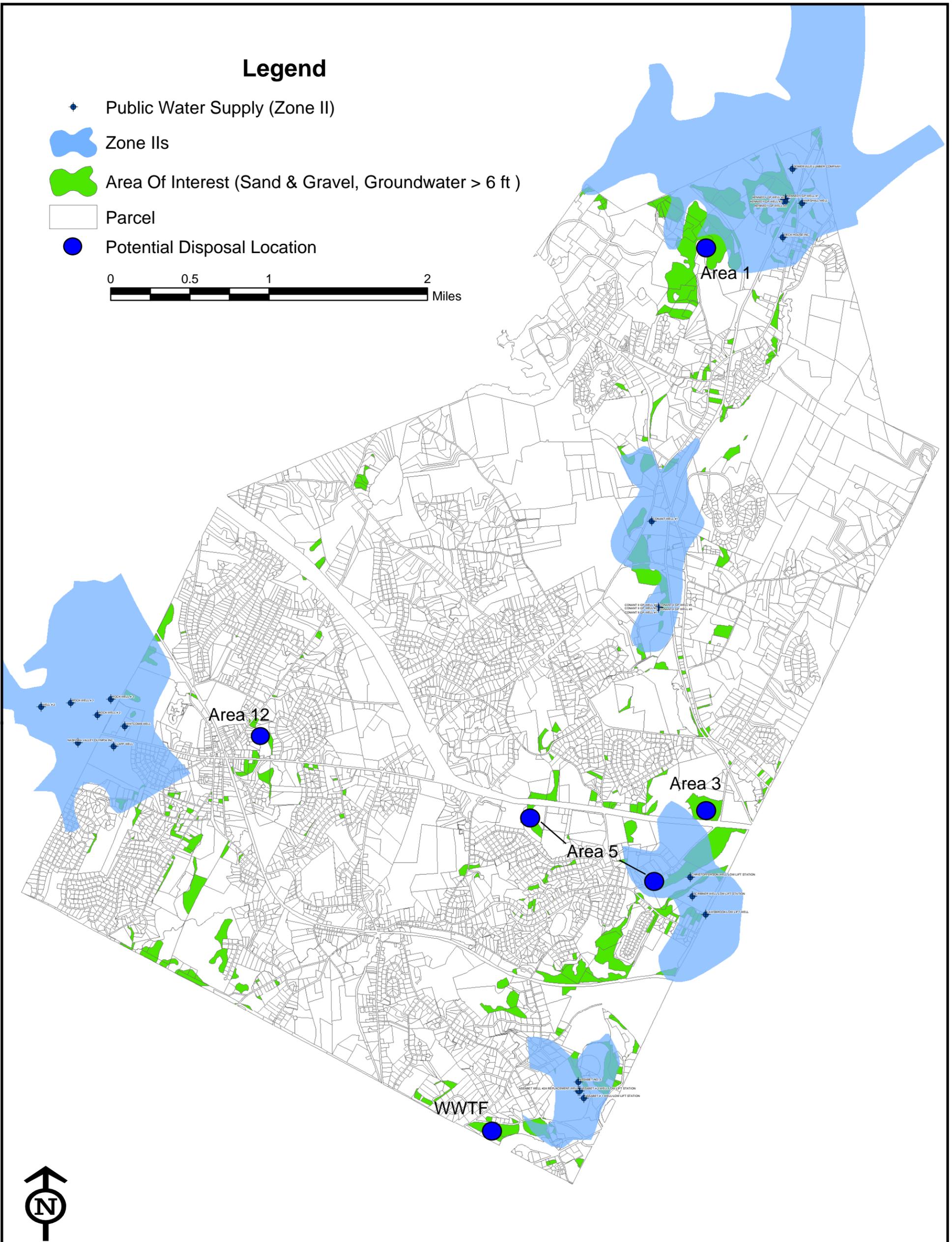
This Phase 2 CWRMP was largely the work of the residents of Acton through a proactive and involved Citizens Advisory Committee (CAC) and public outreach program. While Woodard & Curran and the Town's representatives from the Health Department provided research and technical and regulatory guidance, these residents of Acton discussed and weighed the alternatives in detail to recommend a plan specific for their community.

1.3.1 Citizens Advisory Committee

The evaluation of needs and solutions was conducted in a public forum over 22 months through CAC working meetings and public information meetings. The CAC discussed alternatives at length and worked through rankings of needs and priorities that resulted in balancing concerns, while sometimes modifying recommendations as research results were reported. This evaluation process and final recommendations can be followed in detail by examining the meeting agendas, handouts and minutes from the CAC and public information meetings in Appendix B.

Legend

-  Public Water Supply (Zone II)
-  Zone IIs
-  Area Of Interest (Sand & Gravel, Groundwater > 6 ft)
-  Parcel
-  Potential Disposal Location



Areas Of Interest Comprehensive Water Resource Management Plan Acton, Massachusetts

June 2003

Figure 1-3





Excluding sub-group meetings, the full CAC met on the following dates:

- June 3, 2004
- July 15, 2004
- September 16, 2004
- November 16, 2004 – Public Information Meeting
- April 20, 2005
- July 14, 2005
- August 25, 2005
- November 1, 2005 – Board of Selectmen Presentation
- November 15, 2005
- December 8, 2005 – Public Information Meeting
- January 24, 2006 – Public Information Meeting
- March 16, 2006 – Public Information Meeting
- March 27, 2006 – Board of Selectmen Meeting
- April 3, 2006 – Annual Town Meeting
- April 27, 2006

The April 27, 2006 meeting finalized the CAC’s responses to questions and comments received on the draft CWRMP. Appendix J contains the compilation of the outreach effort and is presented separately from Appendix B for clarity.

1.3.2 Public Outreach Material

The public outreach component the CWRMP included not only the Citizens Advisory Committee meetings but also additional efforts. Appendix B contains the specific materials, which are summarized here:

- Project Summary Report to CAC
Town of Acton, Massachusetts
Comprehensive Water Resources Management Plan/Environmental Impact Report
Phase 1 Review and Phase 2 Kick-off
CAC Meeting -July 15, 2004
- CAC poster boards and handouts for Town Meeting, 2004
- The Boston Globe
Article printed from Boston.com
November 21, 2004
“Outlook grim on wastewater”



-
- Acton Water District Newsletter
“Planning our Water Future: Acton’s CWRMP”
 - Town of Acton Municipal Quarterly
Volume 13 Number 3 October 2005
Acton Massachusetts
“Planning for Wastewater Needs”
 - Status of the Acton CWRMP
“Where Are We Now”
November 1, 2005
Board of Selectman
 - Sample of Postcard Mailing
Announcing the Dec 8, 2005 Public Information Meeting on the Comprehensive Water Resources Management Plan
 - Announcement that the Acton Citizens Advisory Committee for the Comprehensive Water Resources Management Plan will present their findings to the Public, March 16, 2006

The public outreach program continued through the spring of 2006 after the draft CWRMP was released for review. Copies of the draft CRMP were provided for public viewing in February 2006, followed by a public information meeting on March 16, 2006 and further presentation at the Board of Selectmen meeting on March 27, 2006 and Annual Town Meeting April 3, 2006. Comments were received at each meeting with additional feedback through calls and emails to the Health Department. Appendix J presents the compiled comments and questions received and responses issued by the CAC. Many comments resulted in edits to this report.



2. ASSESSMENT OF ALTERNATIVES

2.1 EXISTING CONDITIONS

An exhaustive assessment of existing conditions was conducted as a precursor to the Phase 1 Needs Assessment process. The existing conditions included the built and human environment and the natural environment. The Phase 1 report included discussion of the existing condition and projected status of water (surface water, ground/drinking water, stormwater, and wastewater) quantity, quality and management systems. This section investigates the alternatives available to wastewater collection, treatment, disposal, and management as it relates to overall water quality in Acton.

2.2 CURRENT DISPOSAL PRACTICES IN ACTON

More than 80% of the residents are served by individually owned and maintained onsite wastewater systems. The remainder of the town is served by a combination of a public sewer system and nine privately owned package wastewater treatment facilities (see Figure 2-1). Cluster and privately owned treatment facilities are discussed in the Phase 1 report, but are summarized here for reference.

The 10% of the community not served by public sewer or onsite wastewater systems is served by a combination of nine privately owned package wastewater treatment facilities (WWTFs) and nine smaller common, or cluster, onsite wastewater systems. The common systems usually are constructed so that each dwelling or building has its own septic tank that discharges through an effluent sewer to a common disposal field.

The package WWTFs are primarily governed by MADEP groundwater discharge regulations and receive their primary permit from MADEP. Because the Acton Health Department is quite involved in wastewater management throughout the town, it issues a yearly operations permit for these facilities and inspects them annually. The Health Department is also involved throughout the design, approval, and construction processes, performing significantly more construction inspections than MADEP. Since they serve more than 2,000 residents, these facilities represent a significant part of the town's wastewater infrastructure, and therefore require oversight from the local Health Department.

The common or cluster systems, all with design flows of less than 10,000 gpd, are maintained by condominium associations, even in the case of single-family-home developments. The current regulatory structure in Massachusetts encourages the use of condominium structures for these systems because the legal standing of a condo association is much greater than that of a typical homeowners association. These systems must be inspected on a regular basis — once every 3 years — and their associations must maintain a separate financial account for repair and replacement of the system. The balance on these accounts is reported to the Health Department on an annual basis.

In the late 1990s, Acton approved funding and initiated design of the Town's first wastewater collection and treatment works. In February 2002, Acton opened the Middle Fort Pond Brook Wastewater Treatment Facility, a 250,000-gallon-per-day GPD sequencing batch reactor (SBR)-style facility, and 70,000 linear feet of sewer including 10 pumping stations, three river crossings, and two railroad crossings. The system is designed to serve the remaining 10% of the community, with modular expansion capability to address future needs.

The facility's discharge permit has since been expanded to 2,990,000 gpd. The Town's NPDES permit is included in Appendix C.

Current Wastewater Disposal Practices in Acton

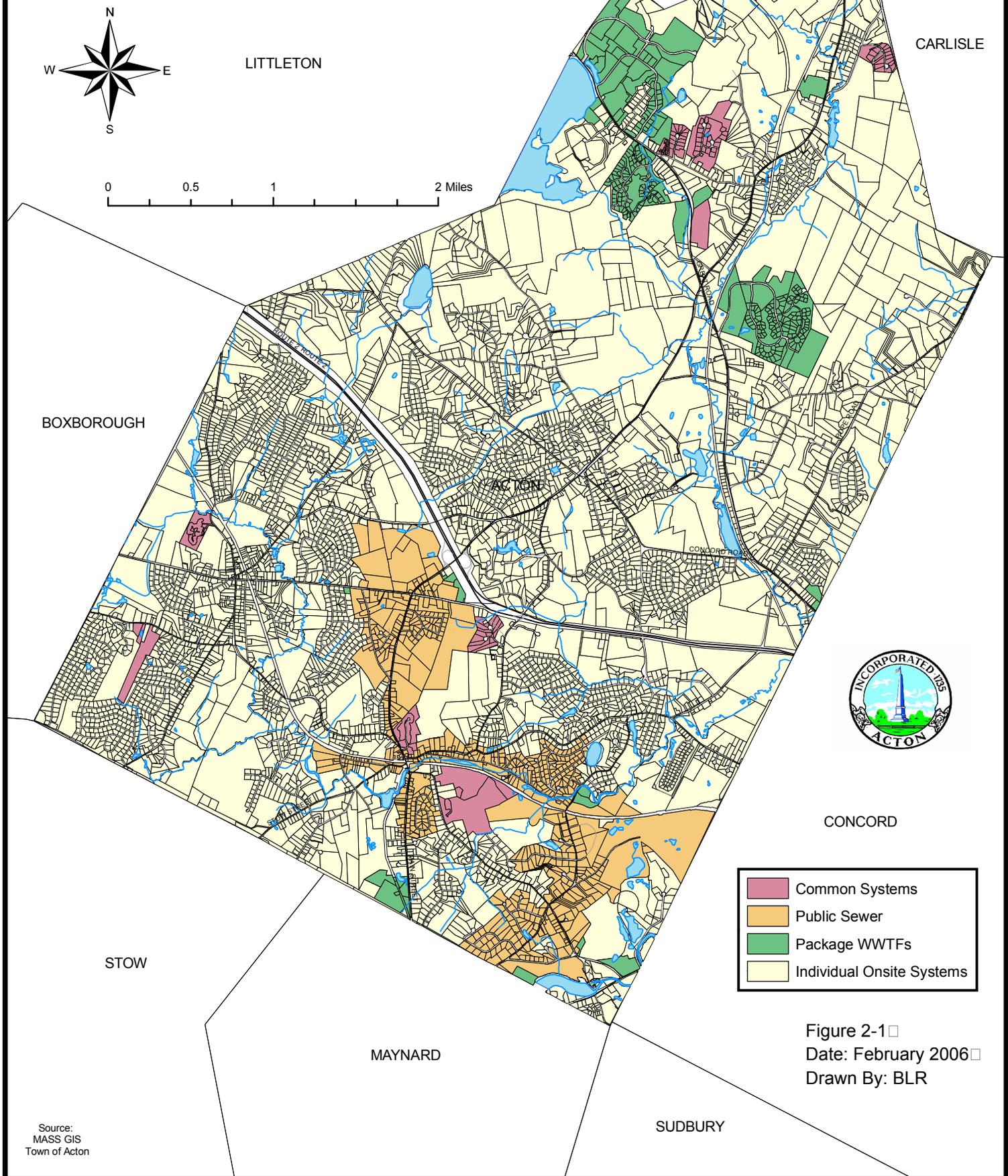


Figure 2-1 □
Date: February 2006 □
Drawn By: BLR

Source:
MASS GIS
Town of Acton



2.3 EVALUATION CRITERIA

A main component of the Phase 1 process was the assessment of the need for alternative wastewater disposal other than continued reliance on conventional onsite wastewater systems. A maximum of 15 Needs Areas were identified. Figure 1-2 shows the location of the following Needs Areas.

1. Marshall Crossing / Robbins Brook / North Acton Village
2. Nagog Woods / Acorn Park / North Acton Woods
3. East Acton Village / Route 2A
4. Concord Road / Robbins Park
5. Brucewood Estates
6. Brookside Apartments/Circle
7. Powdermill Plaza
8. Maynard border / South Main Street
9. Heath Hen Meadow / Billings and Stow Streets
10. Spencer Road and Tuttle/Flint/Mallard neighborhood
11. Nash and Downey Roads / Dover Heights
12. West Acton Center
13. Indian Village
14. Flagg Hill
15. Acton Center (Town Hall) / Patriot's Hill

2.3.1 Needs Areas Development

The Needs Areas were developed through the evaluation of technical and non-technical criteria in a multi-step process involving an interactive dialogue between the Project Team and a very involved CAC. Phase 1 included the first two steps, with Phase 2 picking up with Step 3.

2.3.1.1 Phase 1 Needs Areas Development

Step 1 – Identify Needs in Acton

Areas in need of wastewater disposal solutions are identified. The data from the BOH records, CAC input, previous reports and studies, surface water and groundwater sampling, and local regulations and bylaws form the basis for the analysis of the “needs”. Potential technical alternatives for wastewater collection, treatment, disposal and management are evaluated for application in Acton.

Step 2 – Create Needs Areas

Needs Areas are created based on the technical evaluation and on “non-technical” parameters. Technical criteria include regulatory setback requirements, design parameters, and data on special designs from Board of Health (BOH) records. The CAC reviewed the technical information and provided anecdotal



evidence to complement the technical criteria. Table 2-1 lists the technical criteria evaluated as part of Phase 1, Step 2.

Table 2-1: Technical Criteria for Phase 1

Regulatory Minimum Setbacks	Design Parameters / BOH Data
• Property Line	• Percolation Rate
• Buildings	• Depth to Groundwater
• Wetlands	• Depth to Bedrock
• Floodplains	• Mounded Construction
• Surface Water	• Variances
• Public Well	• Special Technologies (I/A, etc.)
• Private Well	
• Vernal Pools	

Table 2-2 presents the Non-Technical Criteria evaluated as part of Phase 1, which include items raised by the CAC. The non-technical criteria process was used to verify the selection of technical Needs Areas and ensure that the community's entire needs were considered.

Table 2-2: Non-Technical Criteria for Phase 1

Non-Technical Criteria	
• Aesthetics (mounded systems, tree removal, etc.)	• Location of human sensitive receptors
• Neighborhood character – maintain the rural nature of Acton	• Potential to link solution to other opportunities
• Consistency with other town plans	• Regulatory pressure
• Growth – in designated areas	• Ability to implement solution given location, costs, etc
• Archeological and historical impacts	• Costs
• Optimization of existing sewer system	• Protection of environment (wetlands, groundwater, etc)

The CAC recognized that potential solutions are inextricably linked to the criteria that determines Needs Areas and therefore considered the potential to link the solution to other opportunities, such as rail trail construction, as needs criteria for evaluation.

The Project Team presented potential technological solutions to the CAC for evaluation. In-town locations for disposal facilities were identified though an evaluation similar to the needs assessment by searching for publicly owned property and large tracts of private land with favorable soils located outside of sensitive resource areas. Table 2-3 presents the technology alternatives for solutions and the criteria for assessment for disposal sites conducted as part of Phase 1.



Table 2-3: Technology Alternatives and Disposal Site Evaluation

Preliminary Technology Evaluation	Disposal Site Evaluation
<ul style="list-style-type: none">• Onsite	<ul style="list-style-type: none">• Percolation rate (soils type)
<ul style="list-style-type: none">• Clusters	<ul style="list-style-type: none">• Depth to groundwater
<ul style="list-style-type: none">• Decentralized	<ul style="list-style-type: none">• Depth to bedrock
<ul style="list-style-type: none">• Centralized in-town	<ul style="list-style-type: none">• Sensitive human receptors
<ul style="list-style-type: none">• Centralized regional	<ul style="list-style-type: none">• Sensitive environmental receptors
	<ul style="list-style-type: none">• Well impacts
	<ul style="list-style-type: none">• Proximity to Needs Areas
	<ul style="list-style-type: none">• Availability of land

Potential disposal locations are identified through analysis of the technical criteria and by applying the “non-technical” criteria in a method similar to the process used to create Needs Areas.

2.3.1.2 Phase 2

Phase 2 of the CWRMP began with Step 3, in which the CAC finalized the criteria for each Needs Area.

Step 3 – Create Needs Planning Areas

The CAC began the Phase 2 process by assessing the Needs Area groupings developed in Phase 1. The areas were refined based on topography, underlying geology, and socio-economic factors, such as traditional neighborhood boundaries and planned economic growth areas. Figure 2-2 shows the Needs Planning Areas (Areas). The Areas are deliberately large to capture environmental similarities within the Areas, and encompass entire neighborhoods that traditionally may be perceived as single entities. Final solutions may encompass the entire Needs Planning Area or portions of the Areas depending on the needs and a final evaluation prior to program implementation.

Step 4 – Finalize Criteria Ranking

The CAC agreed the Needs Planning Areas identified at this point are in need of new solutions from a technical needs viewpoint. The CAC agreed that all of the technical criteria addressed environmental concerns and are therefore of equal rank, but some “non-technical” criteria are more important than others.

Priority non-technical criteria that address potential solutions include implementability; growth, especially economic growth in areas designated for growth; optimization of the current wastewater infrastructure and wastewater treatment facility (WWTF); and reclaimed water use and recharge of groundwater/aquifers. These criteria are not explicitly attached to specific Areas; rather they are primary, or overriding, criteria for all Areas. A summary of the CAC’s input on important non-technical criteria is:



1. Implementability

Implementability includes of the feasibility of a technical solution, probability of permitting, considerations such as addressing the areas initially planned to be part of an expanded sewer district as part of the Middle Fort Pond Brook system, and local residents' perceptions.

The availability of implementable solutions governs the final recommended solutions. Often a Needs Planning Area will have multiple technical solutions. But, when considering potential solutions, political, financial and popular opinions play a role. The CAC concluded that implementability also meant the ability to convince Town Meeting that the recommended plan is the correct plan, especially considering that residents who were included in the initial plans for an expanded sewer district may not be served under the CWRMP's framework.

The timeline for implementation is also important because of the timing of related projects. The CAC would like to see structural solutions link to other opportunities such as rail trail construction and recreation field development. In addition, pressure from regulatory agencies to solve specific current, potential, or pending, problems may drive the solutions at a schedule different from the CWRMP implementation schedule.

2. Growth

Potential economic growth areas include West Acton Center/Village (Area 12) and East Acton Village (Area 3) extending along Route 2A. The village areas in particular have developed special planning documents and zoning that target the villages for economic growth, but in character with the existing mixed-use environment.

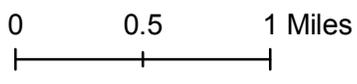
Secondary growth impacts (positive and negative) should be evaluated if expanded wastewater disposal capacity, such as sewerage, is considered in a village area.

Needs Planning Areas

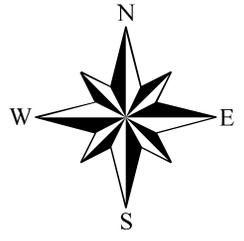
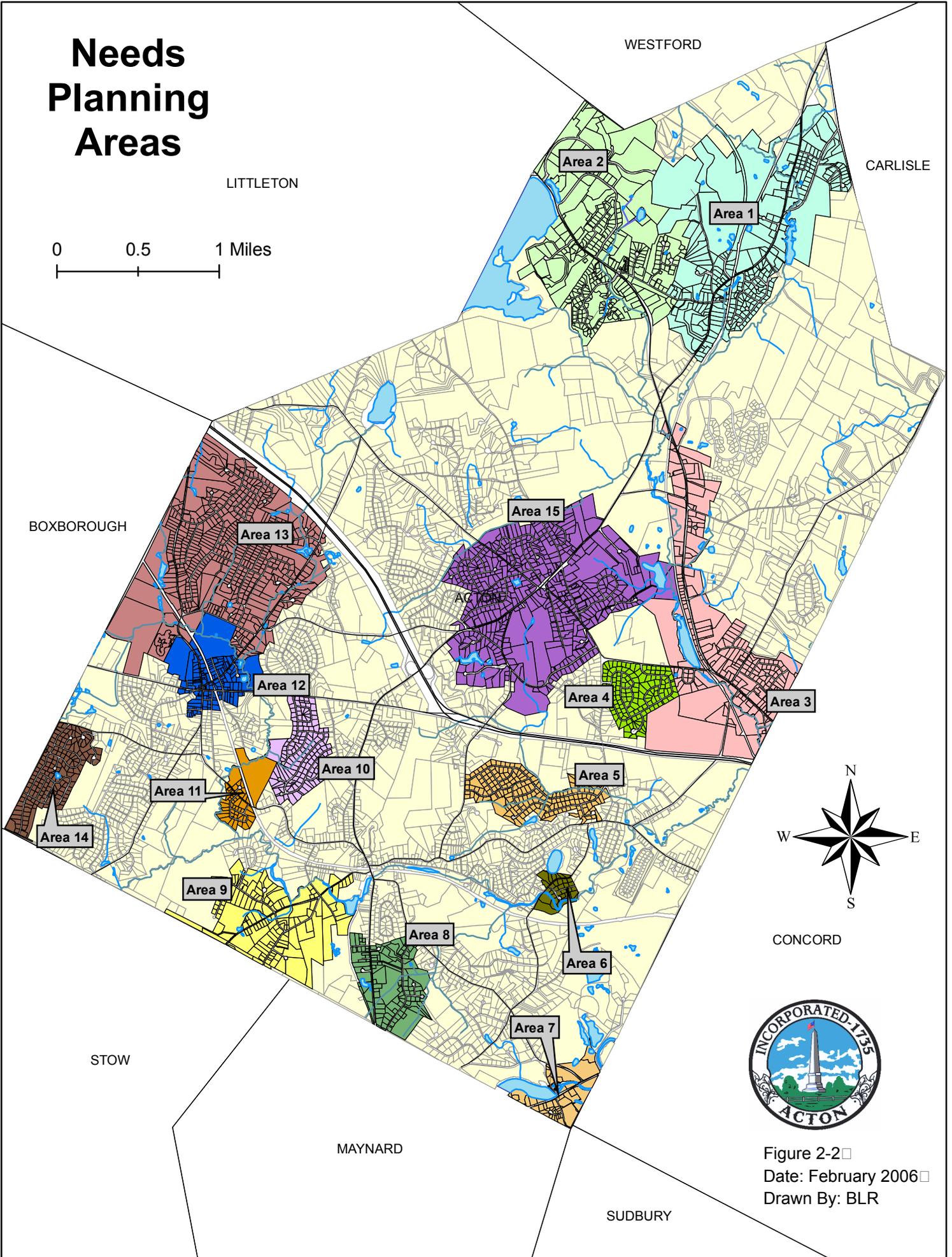
LITTLETON

WESTFORD

CARLISLE



BOXBOROUGH



CONCORD

STOW

MAYNARD

SUDBURY



Figure 2-2
Date: February 2006
Drawn By: BLR



3. Optimization

Optimization of the current wastewater infrastructure and treatment facility, which may include connecting as many properties as possible to fully use the pipes, pump stations and treatment facility may achieve an economy of scale. The CAC agreed that if additional sewerage is developed, the infrastructure should address the Needs Areas as the priority. Solutions should be linked to lots that actually need a solution, not conveniently connecting contiguous properties while leaving out a nearby Needs Area, even if more expensive.

4. Reuse/recharge

Use and recharge of reclaimed water, whether treated wastewater or stormwater, includes finding disposal locations within Acton to recharge the local aquifer instead of seeking a surface water discharge. The existing sewer collection and treatment facilities could be used in conjunction with subsurface discharge locations located some distance from the treatment facility. Other satellite treatment and disposal systems could be located in areas that may recharge aquifers. Wastewater effluent discharge for the purpose of recharging drinking water aquifers may also be a long-range option.

Acton, as a NPDES Phase II community, is undertaking programs to control, manage, and treat stormwater runoff. Acton's S.319 grant addressed the difficulty of siting end-of-pipe treatment and recommended on-site controls. Infiltration in particular can benefit local aquifers. Low Impact Development (LID) is one technique that addresses stormwater at its source instead of through end-of-pipe solutions. Increased infiltration and runoff control is being addressed through development of Acton's post-construction runoff control bylaw.

Step 5 – Rank Needs Planning Areas

Once the criteria were established and finalized, the CAC identified the criteria most important to each Area through discussion of each criteria for each Needs Area. Next the Areas were prioritized through discussion and vote, followed by prioritization of solutions, again through discussion and vote for each Area. The next section presents a detailed discussion of the alternatives assessment process.

2.4 EVALUATION OF ALTERNATIVES

The CAC meeting process from June 2004 through April 2006 provides the road map to the evaluation of alternatives. During these meetings, the Project Team and CAC evaluated and ranked each alternative solution for each Needs Planning Area. Meeting minutes and public outreach material are compiled in Appendix B.

The CAC set some general limits to the feasibility of potential solutions. Generally, extending the existing collection system for Areas north of Route 2 or construction of new collection and treatment systems for Areas adjacent to the existing collection system are considered not feasible.

The CAC prioritized the needs criteria in each Area and then prioritized the Areas. Potential solutions were identified that addressed the needs criteria and resolved environmental and public health concerns. The CAC then ranked the solutions, identifying preferred solutions for each Area that reflected the community's goals for each area and addressed the primary criteria of implementability, economic growth, optimization, and reuse/recharge.



The CAC understood the balance between available solutions and the ability to implement preferred solutions. The preferred solutions may not be readily implementable because of constraints such as cost or disposal capacity. Therefore, the goal of the CAC's assessment was to present the preferred solution with a menu of alternative, and viable, solutions that address the underlying needs and present a framework for the 20-year planning period. Then preferred solutions were re-evaluated given constraints. A final recommended solution for each Area was developed and coupled with a menu of other feasible solutions to give the Town flexibility over the 20-year planning period.

2.4.1 CAC Needs & Solutions Ranking

Though the Needs Planning Areas shown in Figure 2-2 are connected by local roads, drinking water systems, school districts, and natural features, each is a distinct neighborhood with specific needs and goals. The following section summarizes the notes compiled from the review of each Area's needs and potential solutions. The existing characteristics of each Area weighed in the final assessment of solutions.

2.4.1.1 Needs Planning Areas – General Descriptions

Needs Planning Area 1

Marshall Crossing / Robbins Brook / North Acton Village Area is located in North Acton and is predominately residential with three large developments. There is a private treatment facility at the Robbins Brook Assisted Living Facility.

Needs Planning Area 2

Nagog Woods / Acorn Park / North Acton Woods Area is located in northwest Acton primarily straddling Route 2A/119 to Littleton. The descriptive name for this area highlights the number of developments with private treatment facilities. A cluster solution could include a potential tie-in to a proposed treatment plant at the closely located Woodlands development or to the existing treatment plant at Acorn Park. This area also includes the properties served by the North Acton WWTF, which is currently governed by two separate MADEP ACOs prohibiting additional connections or increases in flow.

Needs Planning Area 3

East Acton extends from the Concord line along Route 2A up to the intersection with Route 27. The village area encompasses approximately 40% of this area and is undergoing revitalization and focused planning to regain the village center nature of the area. Commercial establishments dominate the Route 2A corridor along Nashoba Brook leading north from the village center.

Needs Planning Area 4

Concord Road / Robbins Park is a residential development just west of East Acton Village.

Needs Planning Area 5

Brucewood Estates is a residential development south of Route 2 bounded by both Piper Road and Hosmer Street with a large wetland dividing the neighborhood in half.



Needs Planning Area 6

The Brookside area has a small private RBC WWTF (12,000 gpd) that is approximately 20 years old. The Needs Area also includes approximately 15 houses and is located across the street from Pump Station #9 in the Middle Fort Pond Brook sewer system.

Needs Planning Area 7

The Powdermill Plaza area includes the Plaza and Acton Ford. Powdermill Plaza is the site of a private WWTF that discharges to the Assabet River. The plaza is currently in the process of connecting to the Acton WWTF, with provisions for future connections in the immediate area.

Needs Planning Area 8

The Maynard border area is primarily residential with some commercial development immediately adjacent to the Maynard line. This area was included in the original sewer district planning but was removed due to lack of disposal capacity at the Adams Street WWTF.

Needs Planning Area 9

Heath Hen Meadow is a residential area in southwest Acton, bordering Stow, bounded on all sides by wetlands.

Needs Planning Area 10

The Spencer/Tuttle/Flint area was originally included in the early planning for the Middle Fort Pond Brook sewer system, but was removed due to lack of disposal capacity at the Adams Street WWTF. The area is residential with a large wetland and flood plain along the western edge. Prior to development this entire neighborhood was considerably wet, with a ridge near the center.

Needs Planning Area 11

Nash / Downey / Dover Heights Area consists of a residential area to the immediate west of the Spencer Road area and Dover Heights, an apartment complex, which is served by an onsite wastewater system with a design flow greater than 15,000 gpd.

Needs Planning Area 12

West Acton Center is located at the junction of Mass Avenue (Route 111) and Central Street. The center is a traditional mixed use area with small shops and private residences. The Douglas and Gates elementary schools, which share a parcel, are located just north of the Center. The MBTA commuter rail right-of-way bisects the Center in a north-south direction.

Needs Planning Area 13

Indian Village is a large tract of residential properties that developed during the 1950's and 1960's. A large majority of the lots are half-acre, and the terrain is variable. This is the largest Needs Planning Area in terms of size and number of parcels.

Needs Planning Area 14

In Flagg Hill, a cluster or shared system may be possible, but most system problems could be corrected by constructing mounded systems. The lower section of this neighborhood abuts the Zone II for Acton Water District wells.



Needs Planning Area 15

The Town Center is a historic district, and therefore maintenance of the rural character of Acton is important. The center is abutted by residential developments with larger lot sizes, though most are still less than one-acre.

2.4.1.2 High, Medium, Low Ranking Summary

Table 2-4 lists each Needs Planning Area (based on the 15 Needs Areas from Phase 1) with the predominant technical and non-technical needs criteria specific to each Area. From these criteria, the CAC ranked the Areas in terms of off-site solutions because on-site solutions, including establishing special wastewater management districts, are the default solution for all the service areas. Then, the primary criteria of implementability, controlled growth, optimization of the current wastewater system, and reclaimed water use (reuse) and recharge of groundwater/aquifers were assessed for each Area. The rankings resulted in 5 High Priority Areas, 5 Medium Priority Areas, and 5 Low Priority Areas shown in Figure 2-3 Priority Status of Needs Planning Areas.

Table 2-4: Needs Criteria List and Needs Planning Area Ranking

Needs Planning Area	Description	Predominant Technical Needs Criteria	Predominant Non-technical Needs Criteria	Ranking
1	Marshall Crossing Robbins Brook North Acton Village	Wetlands and wetland buffers Zone 1 and Zone II area Floodplains	Senior Housing (Robbins Brook)	Medium
2	Nagog Woods North Acton Woods Acorn Park	Private facilities in noncompliance Wetlands and wetland buffers Proximity to private wells Inadequate lot sizes	Potential North Acton Village plan to be developed	Low
3	East Acton Village Route 2A	Inadequate lot sizes High groundwater - mounded systems needed Wetlands and wetland buffers Floodplains	Economic growth center Aesthetics of mounded systems Village center	High
4	Concord Road Robbins Park	Wetlands and wetland buffers High groundwater - mounded systems needed	Aesthetics of mounded systems	Low

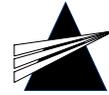


Needs Planning Area	Description	Predominant Technical Needs Criteria	Predominant Non-technical Needs Criteria	Ranking
5	Brucewood Estates	High groundwater - mounded systems needed Wetlands and wetland buffers Flood plain	Aesthetics of mounded systems	Medium
6	Brookside Circle	Wetlands and wetland buffers Flood plain		Low
7	Powdermill Plaza	Partially in a Zone II High groundwater - mounded systems needed Wetlands and wetland buffers WWTF outfall to Assabet Floodplains	Economic growth in commercial area Aesthetic impact of mounded systems	High
8	Maynard Border	Wetlands and wetland buffers		Medium
9	Heath Hen Meadow Billings and Stow Streets	High groundwater - mounded systems needed Wetlands and wetland buffers	Aesthetic impact of mounded systems	Low
10	Spencer Road Area Tuttle / Flint / Mallard	Wetlands and wetland buffers Poorly drained soils - large drainfields on small lots High groundwater	Aesthetic and economic impact of mounded systems	High
11	Nash and Downey Roads	Wetlands and wetland buffers Sensitive receptor - Adjacent to Estimated Rare Wildlife Habitat		Medium
	Dover Heights	Large private system will need a new WWTF or sewer connection per DEP		



Needs Planning Area	Description	Predominant Technical Needs Criteria	Predominant Non-technical Needs Criteria	Ranking
12	West Acton Center	Small lots Dense development Wetlands and wetland buffers Floodplains – (Middle Fort Pond Brook) Large school wastewater system Sensitive receptors – Schools	Town planned economic development center Regulatory pressure to address large system (schools) Historic District Village center	High
13	Indian Village	High groundwater - mounded systems needed Wetlands and wetland buffers Poorly drained soils - large drainfields on small lots	Aesthetic impact of mounded systems	High
14	Flagg Hill	High groundwater - mounded systems needed Poorly drained soils - large drainfields on small lots Partially abuts Zone II	Aesthetic impact of mounded systems	Medium
15	Acton Center Patriot's Hill	High groundwater - mounded systems needed Poorly drained soils - large drainfields on small lots	Aesthetic impact of mounded systems Historic district	Low

The five high priority Needs Planning Areas are highlighted in Figure 2-4. Except for the five High Priority Areas, the Areas were not further prioritized within each priority grouping. The ranking of these five High Priority areas results from the CAC's further assessment of the primary (overriding) criteria, which links to the most timely and inexpensive solution. Given the limitation on disposal capacity at the Adams Street treatment facility, the ranking of the high priority areas also reflects the CAC's preferred order to address these areas if structural solutions are available.



The five High Priority areas ranked from highest to lowest priority are:

- Powdermill Plaza (7)
- Spencer Road Tuttle/Flint/Mallard (10)
- West Acton Center (12)
- Indian Village (13)
- East Acton Village (3)

Once the needs criteria were evaluated and the Needs Planning Areas were ranked, the CAC addressed the potential solutions. The establishment a wastewater management district in each Needs Planning Area is the baseline (default) solution. Structural solutions can then be assessed depending on opportunity and need. Final delineation of each Needs Planning Area will be conducted during conceptual phases of the design or program.

Priority Status of Needs Planning Areas

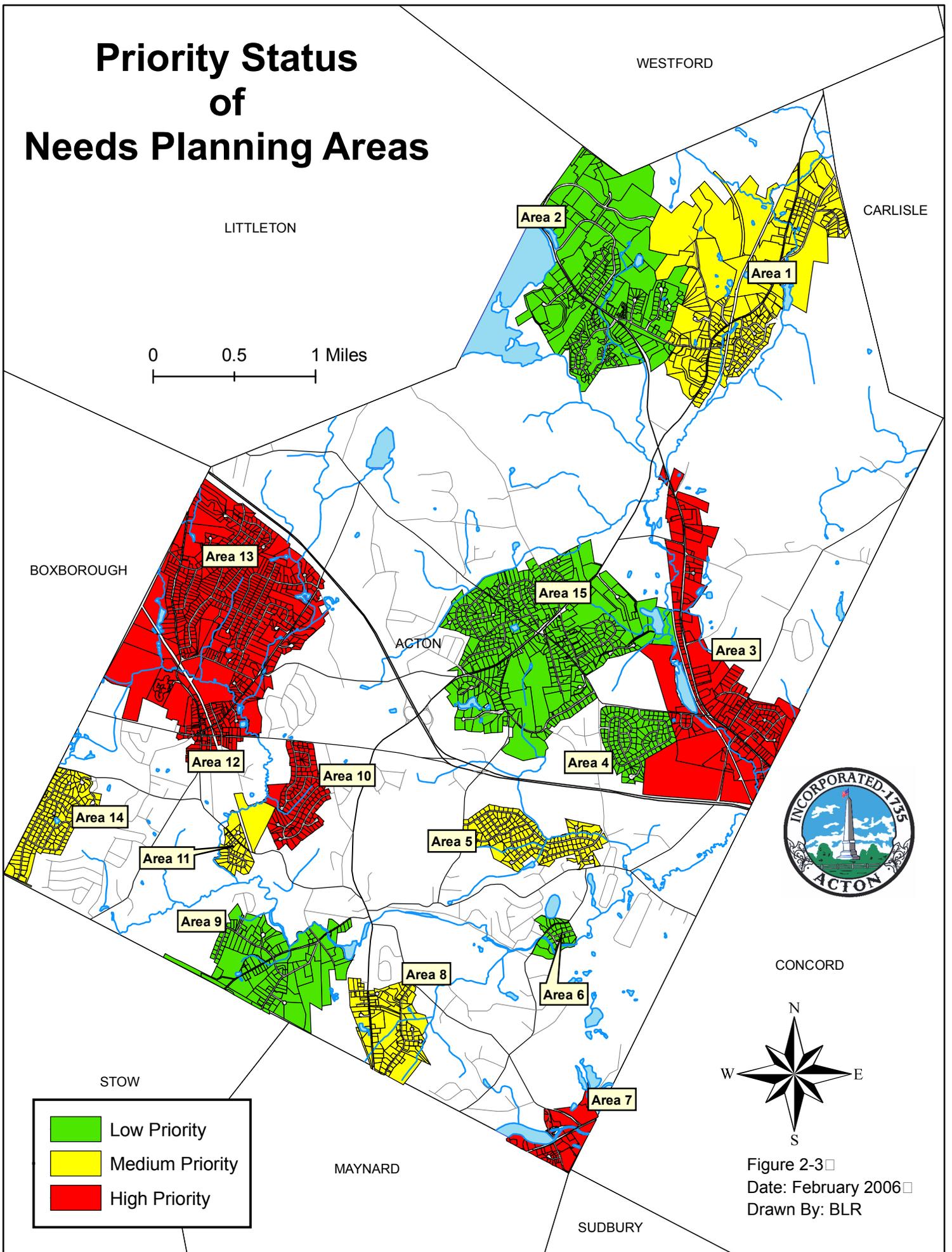
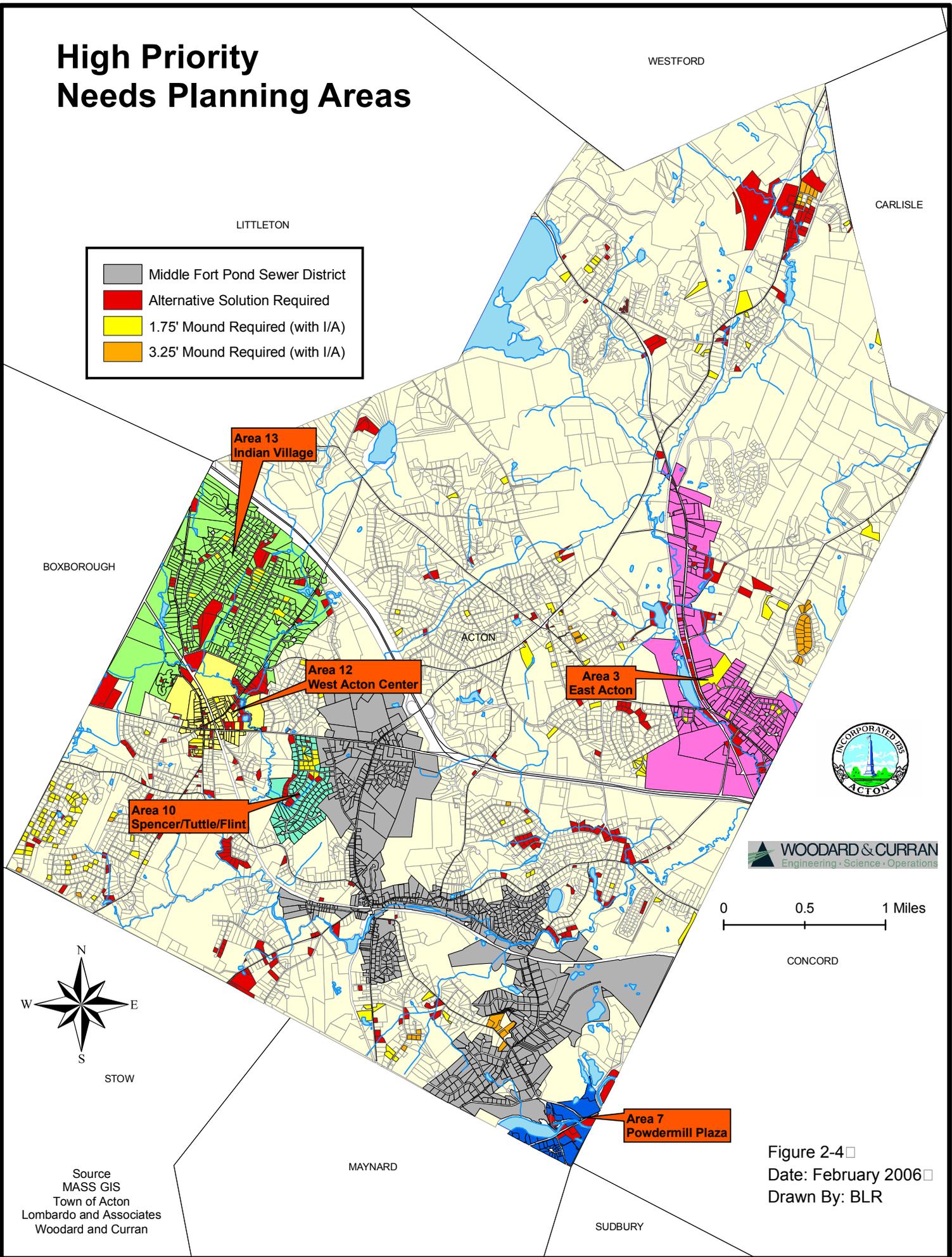


Figure 2-3 □
Date: February 2006 □
Drawn By: BLR

High Priority Needs Planning Areas



	Middle Fort Pond Sewer District
	Alternative Solution Required
	1.75' Mound Required (with I/A)
	3.25' Mound Required (with I/A)

**Area 13
Indian Village**

**Area 12
West Acton Center**

**Area 3
East Acton**

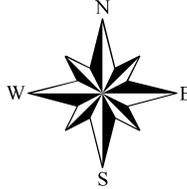
**Area 10
Spencer/Tuttle/Flint**

**Area 7
Powdermill Plaza**



WOODARD & CURRAN
Engineering • Science • Operations

0 0.5 1 Miles



Source
MASS GIS
Town of Acton
Lombardo and Associates
Woodard and Curran

Figure 2-4 □
Date: February 2006 □
Drawn By: BLR



2.5 POTENTIAL SOLUTIONS

The Phase 1 Needs Assessment demonstrates a need to address wastewater disposal issues within the Town of Acton. The potential solutions derived from the Phase 1 process include a combination of the following:

- Continued reliance on onsite wastewater systems (do nothing) under the existing management framework; by definition, the “do nothing” alternative is unsuitable for the Needs Areas but may be suitable for areas outside the Needs Areas.
- Continued reliance on onsite wastewater systems but with a town-managed system that includes enhanced monitoring and stricter treatment standards.
- Cluster / Satellite collection and treatment systems.
- Central collection with treatment at the Adams Street wastewater treatment facility.
- Use of existing in-town private treatment facilities.

Within each of these alternatives are many technological alternatives. This section presents a general discussion of the technologies associated with the alternative solutions.

2.5.1 Collection Systems Technologies

Gravity collection systems are generally the default convention because of the simpler system components and lower operations and maintenance costs (O&M). Alternative collection technologies such as low pressure or vacuum systems can be less expensive to install because of shallower burying depths, particularly for more rural areas where the number of connections is less per linear foot than more densely developed areas. Low pressure or vacuum sewers can be installed where pipe slope must be installed against surface grades.

Gravity Systems

Gravity systems are comprised of large diameter pipe (8-inches or greater) with manholes generally spaced at a maximum of 300 feet and at changes in slope or direction. These systems can be the most economical for life cycle calculations and in densely developed locations with grades to support flow. Most gravity systems have centralized pumping stations to overcome adverse grades.

Low Pressure Sewers

Low pressure sewers are comprised of smaller diameter pipe buried at a depth shallower than gravity systems. These sewers require pumps at individual connections, either grinder pumps that macerate solids or septic tank effluent pumps (STEP) that pump septic tank effluent. Low pressure sewers are commonly used in areas of adverse topography or where deeper excavations will be cost prohibitive due to geology, river/stream crossings, or in rural areas with large distances between customers.

The primary difference between grinder pump systems and STEP systems is the amount of solids conveyed to the collection system. STEP systems rely on septic tanks to remove settleable solids, grease, and grit. Therefore, septic tanks must be pumped regularly. Grinder pumps require slightly more electrical power.



Vacuum Systems

In vacuum systems differential air pressure creates flow. The system requires vacuum pumps to keep a vacuum on the system. The flow into the system is controlled by pneumatic valves at sewage input points. Buffer tanks are required for customers with higher peak flows (over 3 gpm).

The system is characterized by pipes with smaller diameter and shallower burying depths than gravity systems, and relatively easy adaptation to adverse subsurface conditions. Other advantages include reduction in pipe blockages, minimal risk of hydrogen sulfide exposure, and lower power requirements. However, without additional vacuum pumps or other provisions, these systems are limited where elevation differences exceed approximately 20 feet.

Table 2-5 presents some of the “pros” and “cons” related to each collection system technology.

Table 2-5: Comparison of Collection System Technologies

Technology	Pros	Cons
Conventional Gravity Sewer System	<ul style="list-style-type: none"> • Ease of long-term maintenance • Power outage handled with backup power at pump station • Provides excess capacity for future changes 	<ul style="list-style-type: none"> • Higher capital costs • Increase potential for growth where unwanted • Construction <ul style="list-style-type: none"> ➢ Deep excavations disrupt traffic and private property ➢ Not all properties can easily be served by gravity connections ➢ Stream and railroad crossings more expensive
Low Pressure Sewer System	<ul style="list-style-type: none"> • Lower capital cost • Can be sized to reduce growth • Construction – shallow excavation <ul style="list-style-type: none"> ➢ Environmental disruption minimized ➢ Duration of construction reduced ➢ Easier to construct on alternate routes ➢ Suitable for challenging terrain ➢ Reduces stream and railroad crossing effort 	<ul style="list-style-type: none"> • Pumps located on each lot <ul style="list-style-type: none"> ➢ Increased service call effort ➢ Alarm panels mounted on buildings • Electrical costs paid by property owner
Vacuum Sewer System	<ul style="list-style-type: none"> • Lower O&M costs • Can be sized to reduce growth • Construction – shallow excavation <ul style="list-style-type: none"> ➢ Similar to low pressure systems 	<ul style="list-style-type: none"> • Construction and design costs higher than low pressure systems • Limited variety of vendors and service providers • Limited to flat terrain

2.5.2 Onsite Wastewater Treatment and Disposal System Technologies

An onsite wastewater system is a system used to collect, treat, and discharge or reclaim wastewater from an individual dwelling without the use of public sewers or offsite treatment facility.



The three main categories of onsite systems are:

1. Conventional onsite wastewater systems;
2. Mound systems; and
3. Wastewater treatment systems.

A conventional onsite system includes a septic tank and a drainfield. Other types of alternative onsite systems include mound systems, media filters, small aerobic units and pressure distribution systems. Onsite systems now include a number of alternatives that surpass conventional septic tank and drainfield systems in their ability to treat wastewater. Alternative onsite processes, such as sand filters, aerobic treatment units, pressure distribution systems, and disinfection systems must be approved by the DEP. They can be employed in a wide range of soil and site conditions. Alternative systems require more monitoring and maintenance, making a strong case for these systems to be managed.

2.5.3 Wastewater Management Districts

The definition of a “Wastewater Management District” is varied according to the level of management implemented under the auspices of one of these programs across the country. Although the specifics of the individual programs may vary, the foundational principles are the same: *Greater levels of environmental and public health protection through the delineation of a specific area within which the design, construction, operation, and maintenance of onsite wastewater treatment systems will be more closely regulated.*

Wastewater management districts can and have taken many forms depending on a variety of factors:

- Level of funding/revenue available
- Level of environmental and public health risk present with continued use of onsite wastewater systems
- Regulatory infrastructure required for implementation and operation
- Level of acceptability of the potential customers/regulated parties
- Enabling legislation

Evaluating the effectiveness of onsite management program components (such as planning, financial, regulatory, service provider certification) can provide valuable information for adapting program provisions and approaches. A regular and structured evaluation of any program can provide critical information for program managers, the public, and decision makers.

Periodic program evaluations should be performed to analyze program methods and procedures, identify problems, evaluate the potential for improvement through new technologies or program enhancements, and adjust program goals. The program evaluation process should include:

- A tracking system for measuring success and evaluating/adapting program components
- Processes for comparing program achievements to goals and objectives
- Approaches for adapting goals and objectives if internal or external conditions change
- Processes for initiating administrative or legal actions to improve program functioning
- An annual report on the status, trends, and achievements of the management program
- Venues for ongoing information exchange among program stakeholders



Although an annual review is recommended, the management program should have the capability to make interim adjustments in response to unanticipated problems that arise during the course of normal operations.

A considerable public education and involvement process should be implemented for the creation of the management program. Stakeholders from various agencies and citizen groups, including local homeowner associations, civic groups, economic growth committees, neighborhood associations, local environmental and conservation groups, and public agencies should be identified and involved in the program through advisory committees, program review groups, and other volunteer programs. If stakeholders are brought into the process, they are more likely to contribute and feel they have ownership of the outcome.

Key Concepts

With the historical federal grant programs and facility planning guidelines leading to centralized sewerage, onsite wastewater systems (commonly referred to as septic systems) were viewed as a rural solution or a short-term solution until centralized sanitary sewers could be constructed. The trend now is to evaluate the need for sewerage in detail prior to abandoning onsite wastewater systems. These systems, along with “package” wastewater treatment facilities, and clusters of homes served by one common onsite system can be collectively called Decentralized Wastewater Systems

Oversight of these systems, through properly structured management programs is a key component for system performance. To aid in the implementation of management programs, USEPA, in 2003, published the *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*. These guidelines illustrate levels of management from basic regulatory oversight with minimal intrusion into system operation and maintenance, to full-scale public and/or private utility ownership, operation, and management of onsite and clustered wastewater systems.

Management models are defined from Levels 1 to 5. A Level 1 model would involve a basic regulatory framework: issuing permits, performing construction inspections, and keeping records regarding the system components and the maintenance. In contrast, a Level 5 model would involve the creation of a public and/or private utility corporation, or Responsible Management Entity (RME), which would own, operate, and maintain all of the systems within its service area.

A Responsible Management Entity can be an existing governmental body which is given additional powers through promulgation of regulations, a newly created public entity, or a private corporation. No matter how the Responsible Management Entity is created, the goal remains the same. Management entities should regularly review inspection and monitoring data, state water quality monitoring data, customer complaints, fee structures, and data to track progress of the management program in achieving goals and objectives. See Appendix D for a complete explanation of all management levels.

2.5.4 Cluster Systems / Package Plants

A cluster system is a wastewater collection, treatment and disposal system that serves two or more dwellings, but less than an entire community. Cluster systems are most appropriate in moderately populated areas and where larger systems are unwanted or infeasible. These systems are usually located near the buildings they serve and often use soil absorption fields or effluent recycling rather than discharging the treated wastewater to surface waters.



Package plants are cluster-type systems in size and application but also are similar to larger centralized technologies. Alternative collection technologies can be used to convey the wastewater to the plant.

2.5.5 Satellite Systems

For this planning process we identified satellite systems as larger than neighborhood cluster systems and comparable to the existing Adams Street treatment facility. Assuming a suitable disposal location could be located, a remote, or satellite, centralized treatment facility could be constructed to service a large Needs Area, encourage economic growth, or combine Areas into a common solution.

Treatment technologies would be similar to conventional centralized systems, taking advantage of newer, more efficient and reliable processes, equipment, and methods. In Acton the Adams Street treatment facility utilizes sequencing batch reactors (SBRs). Therefore, for consolidation and streamlining of operations and maintenance activities, the most logical technology for a comparably sized remote facility would be SBRs. Discharge requirements would drive the selection of specific equipment in the facility, and could include equipment such as effluent filters for nitrogen reduction.

Areas of interest for satellite treatment and disposal locations were identified during the Phase 1 process. An assessment process was conducted through the CAC to identify parcels suitable for disposal that could be linked to the highest priority Needs Areas. The Project Team followed up with a site specific hydrogeologic investigation of the parcels to make a preliminary determination of disposal capacity.

2.5.6 Centralized Treatment

Conventional municipal treatment facilities have historically been designed and constructed as centralized systems, which collect and treat the wastewater from a large area. Centralized treatment for this planning process is identified as extensions of the existing publicly funded collection system.

The extent of sewer extensions is dependent on the capacity of the WWTF to treat and dispose of the treated effluent. In Acton, the Adams Street WWTF is currently permitted to discharge up to 299,000 gpd to rapid infiltration basins on the bank of the Assabet River.

2.6 EVALUATION OF STRUCTURAL SOLUTIONS

Within the Town of Acton, several structural solutions are possible. The Project Team and CAC investigated and evaluated the availability of alternative discharge sites for satellite systems, extension of the Middle Fort Pond Brook collection system to remove the Powdermill Plaza surface discharge, and extension to other Areas with onsite wastewater problems.

2.6.1 Preliminary Hydrogeologic Study – Potential Disposal Locations

The Phase 1 report identified four sites as potential locations for wastewater treatment and disposal systems, from which a scope for preliminary hydrogeologic site evaluation of the four sites was developed. The Project Team submitted a Preliminary Hydrogeologic Study, which presents the findings and conclusions of the preliminary hydrogeologic site evaluation, to DEP. The report was reviewed by DEP and the Project Team and DEP met on January 26, 2006 to discuss the conclusions and recommendations. Appendix E contains the report, including DEP comments, in its entirety. This section presents a summary of the evaluation, conclusions and recommendations from that report.

As part of the Phase 1 Report, potential areas for wastewater treatment and disposal were identified through the evaluation of US Geological Survey (USGS) surficial geology maps, National Resource



Conservation Service (NCRS) soils maps, data available from the Acton Health Department, and other parcel-specific information from assessor's data and mapping.

Targeted were parcels of meaningful size, whether vacant, publicly owned, or minimally developed. The criteria identified under Phase 1 for these parcels also included other considerations such as locations that were not likely to affect sensitive environmental and human receptors, or those that were too close to the wellhead protection area surrounding a municipal well. Once the potential locations were selected, the Project Team conducted a site walk at each of the locations with DEP personnel.

A program of subsurface exploration was developed and submitted to the DEP as a preliminary phase. The exploration program included test pits and deep hole tests, and a number of test borings with soil samples and borehole permeability tests.

The objective of the exploration program was to acquire preliminary data on the three principal hydrogeological features of each site, which impact the application rate for the disposal of wastewater. These hydrogeological features were:

1. The type of overburden soils at the location – the proportion of preferable coarse grain (sands and gravels) versus fine grain soils (silts or clays);
2. The thickness of these overburden soils (the depth to till or bedrock); and
3. The depth to seasonal high water table which would affect the allowable groundwater mounding.

Field Work and Data Analysis

Figure 2-5 displays the location of the parcels in relation to the High Priority Needs Areas. We conducted a fieldwork program that included the following locations and task activities:

- Wetherbee Street / Route 2 – Service to High Priority Area 3 and Area 4
 - Two test borings to refusal (permanent wells)
 - Two test borings to refusal (temporary wells)
 - Six test pits
- Adams Street – Potential expansion of the Adams Street WWTF
 - Two test borings
- High Street – Potential expansion of the Adams Street WWTF
 - Used existing exploration information developed during initial well field development and subsequent studies related to the W.R. Grace facility.
- North Acton – Potential service to Medium Priority Area 1
 - Two test borings (permanent wells)
 - Two test pits

As we looked for viable locations for discharge we recognized the potential value of the W.R. Grace property, off Independence Road, such as size, proximity, groundwater depths and soil types but ultimately did not choose to analyze the site because EPA's Record of Decision regarding the site's remediation had not yet been issued.

Soil samples were collected at selected borings and test pits and sent to a soils laboratory for washed sieve grain size analyses. This data was used to estimate the hydraulic conductivity of the soils. Additional numerical data was generated during the test boring installations. Bore hole permeability tests were run by the falling head method. Mounding simulations for this study were then completed using the well-accepted groundwater model developed by MacDonald and Harbaugh for the USGS in 1988.

Disposal Sites for High Priority Needs Planning Areas

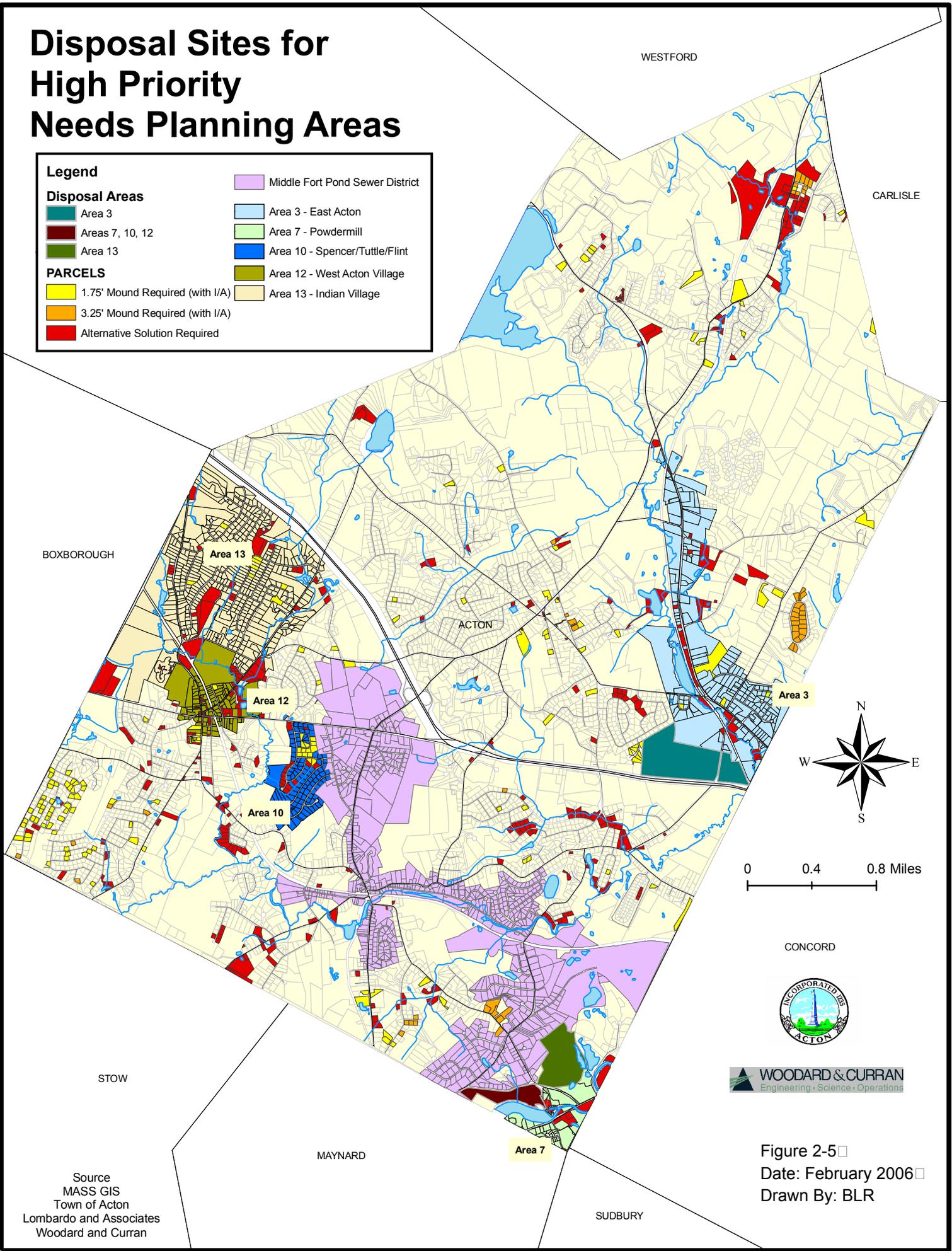
Legend

Disposal Areas

- Area 3
- Areas 7, 10, 12
- Area 13
- Middle Fort Pond Sewer District
- Area 3 - East Acton
- Area 7 - Powdermill
- Area 10 - Spencer/Tuttle/Flint
- Area 12 - West Acton Village
- Area 13 - Indian Village

PARCELS

- 1.75' Mound Required (with I/A)
- 3.25' Mound Required (with I/A)
- Alternative Solution Required



Source
 MASS GIS
 Town of Acton
 Lombardo and Associates
 Woodward and Curran



Figure 2-5
 Date: February 2006
 Drawn By: BLR



Conclusions

The most promising location, hydrogeologically, is the Wetherbee Street site, which is aligned with the East Acton Needs Planning Areas (Area 3 and Area 4) as an offsite alternative. The Wetherbee site has the greatest capacity for treated wastewater application with the least mound creation. The other three sites do not exhibit the potential capacity without other technical or hydrologic hurdles. Research into the availability of the Wetherbee parcel has uncovered a deeded legislative conservation restriction, which precludes uses other than for conservation.

The North Acton site is able to accept loading rates up to one gallon per square foot per day, but it is a small site with limited total capacity. The ground surface on the majority of the site is heavily disturbed and much of the native material has been removed. The CAC did not rank an offsite treatment facility and disposal field at this location as the preferred/priority solution. Therefore, we do not recommend further study of this area.

Loading at the Adams Street location is problematic because of potential disturbance to the vernal pool located in the middle of the parcel, possible slope breakout toward the river and potential influence on the groundwater level at the Maynard wastewater treatment facility site. The Town owns the parcel and can hold it available if the Town identifies additional needs that justify further detailed exploration.

The High Street parcel does not support a dispersal location with a two year's travel time from the municipal wells. Discharge of treated wastewater south of the Grace property at the High Street well fields parcel will require extensive exploration and groundwater flow testing to confirm that any possible dispersal location is more than one year's travel time from the municipal wells. We do not recommend further study at this site under this CWRMP.

Recommendations

The potential disposal areas have drawbacks that limit the Town's options. But each Area associated with the four dispersal locations has another viable solution in addition to construction of a satellite facility. Therefore, we do not recommend further hydrogeologic study as part of the CWRMP, nor do we recommend satellite systems as a final recommended solution.

We recommend that the Town clarify the inaccessibility of the Wetherbee Street site to determine if this parcel is a nonviable alternative for East Acton in addition to cluster/shared systems and a wastewater management district.

2.6.2 Reclaimed Water Use

Appendix F is a summary of the discussions, research, findings, and opinions of the CWRMP Indirect Potable Reuse Working Group (IPRWG).

The IPRWG formed in May 2005 as a subgroup of the CAC, with a mission of exploring and evaluating the concept of Indirect Potable Reuse of treated wastewater and its feasibility as an option for discharge within the Town of Acton.

Within the context of the 20-year CWRMP, reuse of highly treated wastewater treatment plant effluent was viewed as a potentially feasible aquifer recharge method, resulting in the preservation of the hydrologic cycle.



The IPRWG was established to bring together local stakeholders with a variety of viewpoints. Members evaluated and discussed information from regulatory and scientific sources. The group met between June 2005 and October 2005, and issued a Final Report dated November 15, 2005. Prior meeting minutes were prepared and distributed at these meetings, as well as summaries of research articles and fact sheets. The IPRWG focused their concerns on the following four areas:

1) Detection, removal and potential health effects of multiple classes of emerging contaminants.

The research reviewed by the IPRWG identified new classes of emerging contaminants in wastewater, drinking water, groundwater, and surface water. Medical and toxicological data research is ongoing, including a study by Johns Hopkins Bloomberg School of Public Health, for which the Town of Acton is a participant. The studies to date have focused on the prevalence of these new contaminants, and not potential health effects. Therefore the group recognized that research aimed at understanding the health effects of emerging contaminants is very preliminary, and that further areas of discovery would yield more data that could be useful in future discussions.

2) Timing of implementation in regards to technological, regulatory, and political timelines.

Although the Commonwealth of Massachusetts is currently developing a new set of Reclaimed Water Regulations, indirect potable reuse as an effluent discharge strategy is uncommon in the northeast U.S. The IPRWG recognizes that if the Town decides to pursue this concept an education program would be required at the state and local levels to gain public support before attempting to implement the technology. Furthermore, the additional costs of implementing this type of program are not currently funded under the CWRMP.

3) Comparison of centralized indirect potable reuse in one wellfield versus decentralized indirect potable reuse in multiple wellfields.

If considered as a viable effluent discharge option, indirect potable reuse would need to be evaluated in terms of effluent discharge locations, and the potential benefits of multiple discharge locations to allow for broader basin-wide recharge.

4) Coupling implementation with increased water conservation and emerging contaminant source reduction efforts.

The implementation of indirect potable reuse may be an opportunity to raise awareness of the need for larger scale water conservation measures. Local education efforts could lead to further citizen involvement in water resource protection, specifically in efforts to reduce or eliminate the presence of chemical contaminants (such as those in pharmaceuticals and personal care products) in the waste stream.

2.6.2.1 Implementability Issues

The AWD's assertive water conservation program has made significant headway in reducing per capita water usage. However, in the 2004 Water Assets Study, EOEa recently projected a buildout water demand of 2.13 MGD, which is above the AWD's Water Management Act regulated annual withdrawal volume of 1.93 MGD.

As a potential mitigation of this shortfall, the Project Team's Preliminary Hydrogeological Study investigated the High Street well fields (Assabet #1 and Assabet #2 wells) for a potential reclaimed water dispersal site. Studies related to the W.R. Grace Superfund site provided subsurface and groundwater



data for the site. But, until regulations reduce the limits on travel time, the potential disposal site is infeasible. Any interaction with groundwater contamination plumes would have to be carefully evaluated in conjunction with investigation of issues raised by the IPRWG prior to discharge.

The success of the AWD's water conservation program, coupled with uncertainties with emerging contaminants, eliminates indirect potable reuse as an immediate solution. However, the IPRWG's Final Report recognized the potential for indirect potable reuse as a future water resource management strategy. The Group suggested that further exploration of this alternative was warranted, and recommended a small-scale pilot study at the Adams Street WWTF, close coordination with state and federal regulators, and study of other programs implemented in the United States. If future research and technologies address concerns about emerging contaminants, and residents support a reclaimed water initiative, the Town could potentially use reclaimed water to replenish its aquifers for future demand.

2.6.3 Extensions of the Existing Collection System

2.6.3.1 Powdermill Plaza (Area 7)

Appendix G contains studies related to the Powdermill Plaza wastewater treatment facility, as well as a copy of NPDES discharge permit. The Powdermill Plaza facility has an average daily flow of 1,750 gallons per day (gpd) but has a discharge permit limit of 12,000 gpd (NPDES Permit #MA0028835). The actual peak daily flow according to the available data is approximately 2,800 gpd, while the facility is permitted for 24,000 gpd peak daily flow.

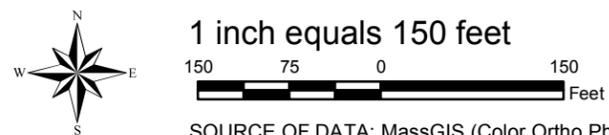
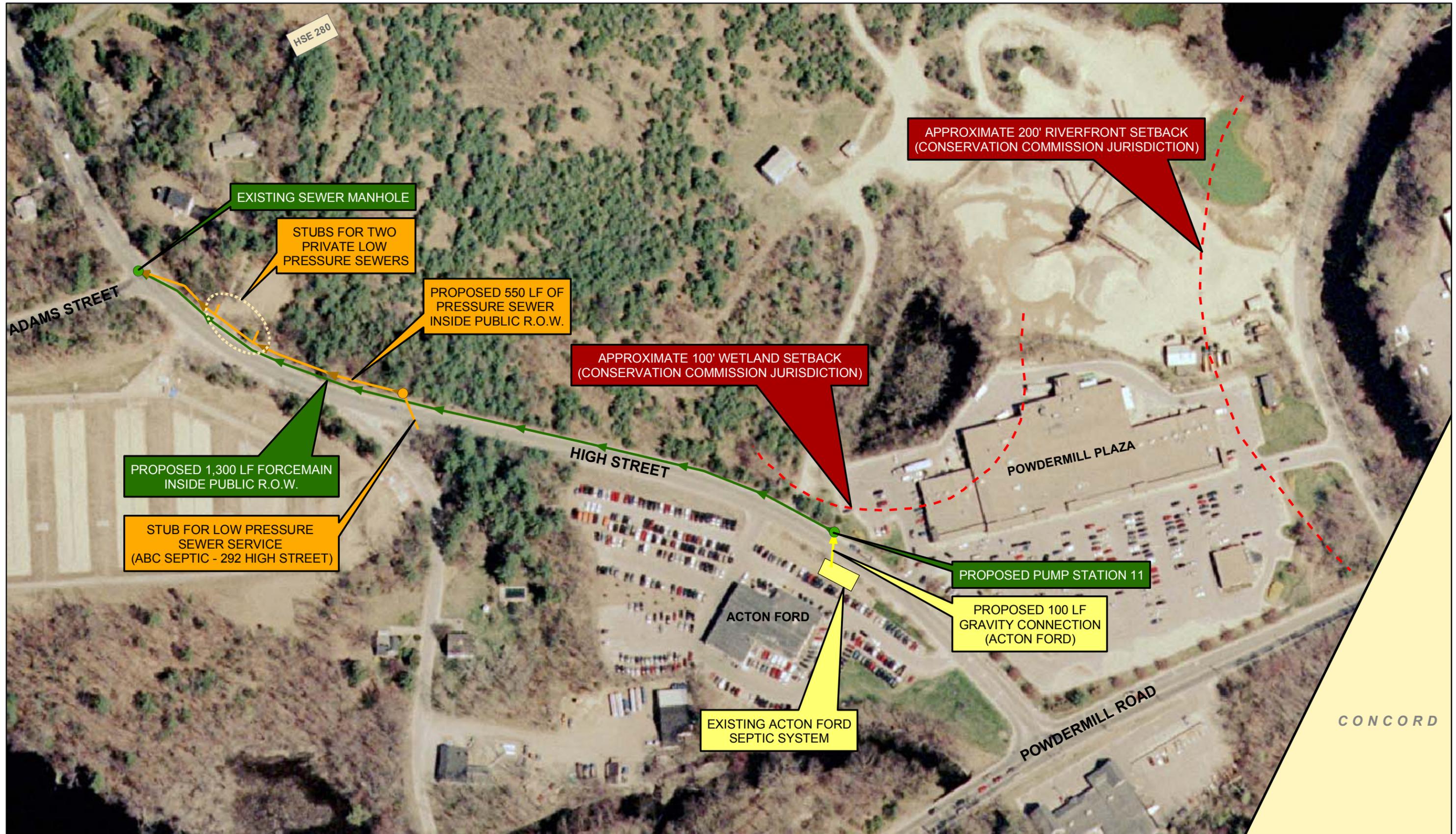
The Town of Acton has entered into a design contract for the High Street Extension Project, which is expected to be constructed in summer 2006. This project is intended to allow the decommissioning of the existing facility while servicing the remaining properties in this corner of Acton.

Figure 2.6 shows the project's features, including a pump station at the intersection of High Street and Powdermill Road (Route 62) initially intended to service both Powdermill Plaza and Acton Ford but with the future capacity for the tributary area including Knox Trail, Old High Street, and portions of Powdermill Road (Route 62) and Sudbury Road.

This project removes a WWTF discharge point from the Assabet River, which is in line with the recently published TMDL study of the Assabet River. This study assumes the Powdermill Plaza facility is removed in order to calculate river loadings. The report recommends more stringent discharge limits for phosphorus for all treatment facilities discharging to, or adjacent to, the Assabet River.

The project has been bid and the Project Design Team is evaluating the bids.

TOWN OF ACTON HIGH STREET SEWER EXTENSION





2.6.4 Other Sewer Extensions

2.6.4.1 Collection System Designed Capacity

The Middle Fort Pond Brook collection system was designed for expansion, primarily for expansion toward the west along Mass Ave and Central Street. Expansion flexibility was designed into the main collection system components, pipelines, and pump stations. Gravity pipelines usually provide sufficient capacity for expansion since the smallest acceptable diameter pipe can convey large flows. At the most basic level, 8-inch gravity sewer installed at minimum slope can accommodate approximately 0.5 MGD of flow, which is sufficient to accommodate the permitted discharge capacity of the WWTF.

In any scenario, extending sewers to the west would convey wastewater through Pump Station 1 on River Street. The station was designed for three pumps to accommodate future flows. The Middle Fort Pond Brook Sewer area and its designed flow capacity of 250,000 gallons per day only required two pumps; therefore, two of the three pumps were procured and installed as part of Construction Contract 2. The wet wells and structures were constructed to accommodate the third pump.

Pump Station 1 has two 800 gpm pumps and a 12-inch force main, although two 600 gpm pumps and an 8-inch force main would be sufficient for the flow from the existing sewer area. Therefore, Pump Station 1 has available capacity for future flows up to at least the 299,000 gpd planned under this CWRMP, with room for expansion. At this conceptual level, the capacities at the other pumping stations that may connect to sewer extensions should be closely investigated to account for buildout capacity within the existing sewer area and potential flow from new connections.

2.6.4.2 WWTF Capacity Expansion

From the initial Design Basis Report for the Middle Fort Pond Brook WWTF, the system was planned and designed for initial and potential future flows. In an effort to expand the wastewater treatment plant in the most efficient and cost effective manner, the design basis included provisions for a Phase I design ADF of 250,000 gpd and a future design ADF of approximately 1.0 million gallons per day (MGD).

The WWTF was designed in a modular fashion to accommodate expansion of the collection system, reaching 500,000 gpd without adding complete treatment trains. The current permitted discharge rate to the rapid infiltration basins (RIBs) is 299,000 gpd. Table 2-6 presents the actual designed and constructed stages of expansion.

Table 2-6: Adams Street WWTF Expansion Stages

WWTF Condition and Changes	Maximum Flow (gpd)	Available Capacity (gpd)
O&M changes and increase in permitted discharge to existing RIBs	299,000	49,000
Additional disposal area and upgrade of some process equipment	500,000	250,000
Additional treatment trains and further additional disposal area	1,200,000	950,000



2.6.4.3 Implementability Issues

Because the Preliminary Hydrogeologic Study found no sites without drawbacks for additional discharge, the WWTF is limited to treating and discharging 299,000 gpd for the immediate future. To extend the sewer system to maximize the disposal capacity would require upgrading of pump stations downstream of the newly sewered area. The system should be amenable to such changes since the system was designed to accommodate future sewer areas.

2.7 EVALUATION OF NON-STRUCTURAL / MANAGEMENT SOLUTIONS

Management of the sewer collection system to optimize system capacity is a basic management function. One way to optimize a system is to maximize the number of connections to most efficiently use the system's components. Optimizing also means adding the optimum number of connections to minimize the costs to customers. Acton currently contracts its operations and maintenance functions to a private entity; therefore, costs are also optimized through negotiation of contract fees.

2.7.1 Wastewater Management Districts

Acton, because of its complete reliance on decentralized wastewater systems until the late 1990s and ongoing reliance on these systems for 90% of its population today, has always worked within a management structure that has matured over time into its current version.

2.7.1.1 Existing Program

Under its current regulatory structure, the Town qualifies as a hybrid management model Level 1 – Level 2 based on EPA's model. The management structure includes:

- The permitting and installation of conventional onsite systems – defined as a system with a septic tank and a soil dispersal area – in accordance with a set of prescriptive codes;
- A function-based inspection of systems at time of property transfer;
- Required lifetime operation and maintenance (O&M) contracts with reporting and effluent sampling requirements on advanced onsite treatment technologies; and
- A regulation requiring the pumping of conventional septic tanks at least once every two years.

Inspections, tank pumping events, system component characteristics and locations, permits, and O&M contracts are all tracked by parcel using a combination of databases and geographic information systems (GIS). This database can then generate reminder letters to system owners, encouraging them to have their systems serviced to ensure proper function.

Septic Tank Servicing

Basic management of decentralized systems began in the early 1970s, when the Acton Board of Health promulgated a regulation requiring all residential septic tanks to be serviced at least once every two years. Up until the mid 1980's, this was quite simple to track as the Town operated a septage disposal area. Once the disposal area was decommissioned, a new approach to this management function was necessary.

A separate ticket was developed for reporting each individual servicing event. These tickets are submitted by the Licensed Septage Haulers on a monthly basis, along with a per ticket fee, which is currently \$20. This fee is collected into a separate Enterprise Fund, which can only be used to fund wastewater management activities.



Before the advent of efficient personal computers and Geographic Information Systems (GIS) software, the records were tracked on a reporting sheet in each property's file. Now, the Acton Health Department uses a portion of those funds collected from the reporting fees to fund a part-time staff clerk to record service events into a Microsoft Excel spreadsheet for translation into a GIS database. The database also allows reminder letters to be sent to homeowners who have neglected to service their septic tanks on a regular basis and allows for the production of reports and graphics such as Figure 2-7.

An average of 1,739 properties had their septic tank serviced at least once during the years 2002-2004. With a little more than 5,000 traditional onsite systems (septic tank followed by a disposal area) in the town, this equates to over one-third of the systems serviced each year. The current management structure within the Town has both increased owner awareness of the maintenance necessary with onsite systems. It has also increased stakeholder buy-in from the local septage haulers, who have adopted the program into their marketing activities.

Some of the systems serviced between 2002 and 2004 are duplicates because of property transfer inspections or other drivers. However, over 90% of the septic tanks in Town are serviced at least every three years, and over 200 systems are inspected each year. With this record of service, it is not surprising to note that the average lifespan of a conventional onsite system in the Town of Acton is at least 25 years.

2.7.1.2 Implementability Issues

The most significant obstacle to the implementation of Wastewater Management Districts in Acton is the need for the program to be self-sustaining and possibly revenue-generating. Other obstacles will include:

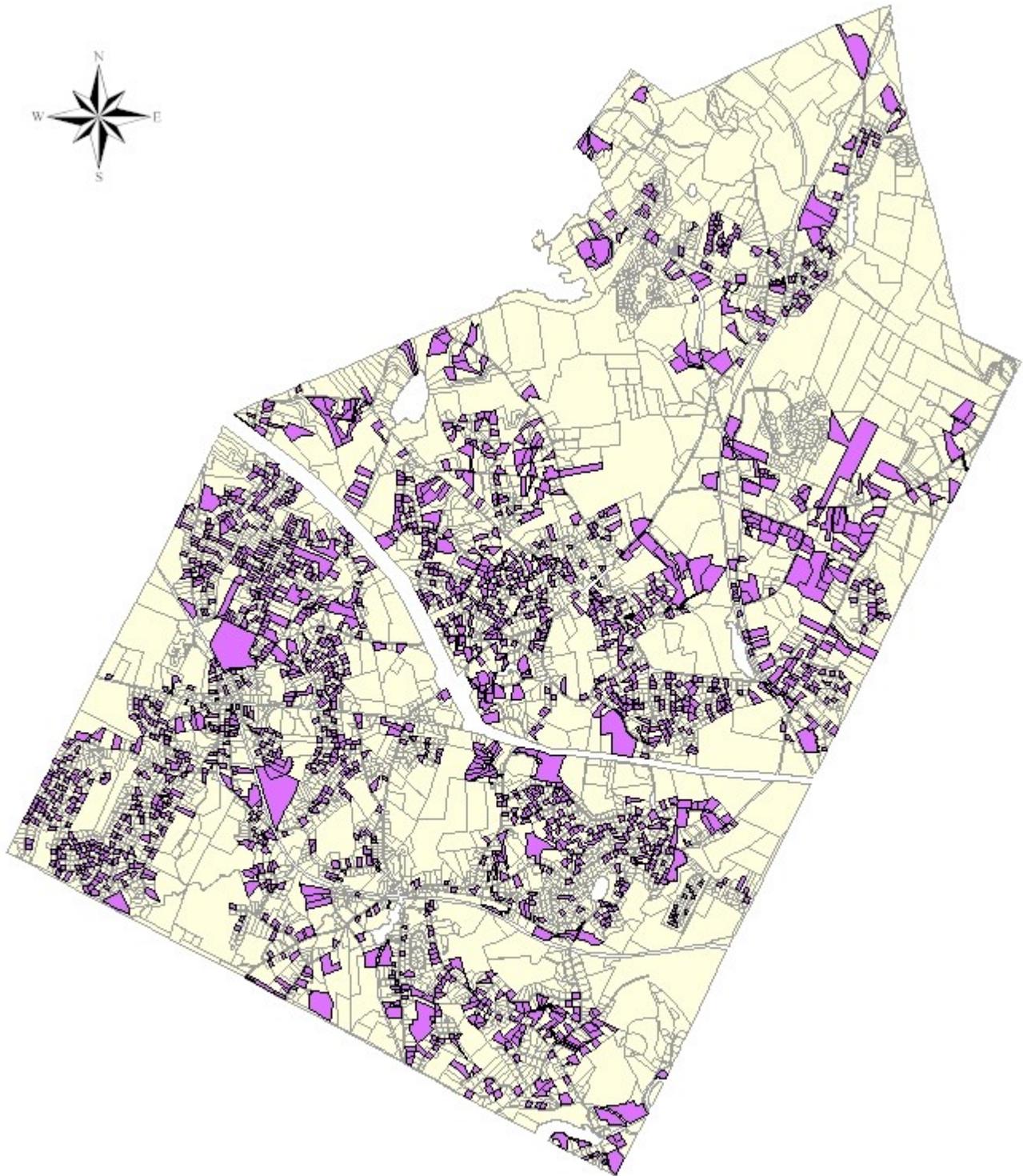
- Acceptance by all stakeholders, including property owners, septage haulers, system installers, system inspectors, and local design engineers
- Ability to integrate the program into the existing administrative profile of municipal government in Acton
- Development of the proper legal and financial structures

A considerable public education and involvement process should be implemented for the creation of the management program. Stakeholders from various agencies and citizen groups, including local homeowner associations, civic groups, economic growth committees, neighborhood associations, local environmental and conservation groups, and public agencies should be identified and involved in the program through advisory committees, program review groups, and other volunteer programs. If stakeholders are brought into the process, they are more likely to contribute and feel they have ownership of the outcome.

Acton has used and will continue to use a variety of mechanisms to finance the recommendations of the Comprehensive Water Resources Management Plan. In 1990 the majority of Acton's septage from individual homes and businesses was being transported to the Greater Lawrence Sanitary District Wastewater Treatment Facility. However, the plant was forced to bar septage acceptance when they repetitively exceeded their permit quality requirements. The only solution Acton could find for its residents was transport to the Upper Blackstone facility.

Although Upper Blackstone was willing and able to accept Acton's septage, they were not willing to take on the responsibility of tracking and billing waste haulers. In order to ensure its residents access to the facility, Acton agreed to take on that responsibility. By taking on that responsibility the Town encountered its first challenge; how to bill and pay for a septage transport program while maintaining a positive cash flow with no impacts to the Town's Proposition 2 ½ cap.

Septic Tank Pumping Events 2004 Town of Acton, MA



 **Septic Tank Pumping Events 2004 (1721)**

Figure 2-7 □
Date: February 2006 □
Drawn By: BLR



This problem was addressed by accepting Section 39K of Chapter 40, Massachusetts General Law, and establishing an Enterprise Fund for the purposes of Septage Management. This allowed the Town to collect revenues outside the requirements of Proposition 2 ½ and allow the fund to expand or contract in accordance with market conditions.

The contract with Upper Blackstone required the Town to pay for septage discharges within 30 days from being billed each month. In order to maintain a positive cash flow Acton required the Septage Haulers to pay before a permit to discharge was granted by the Town. Through this mechanism, a positive cash flow was maintained that also allowed for a period to be assured that each payment by the haulers had been cleared by the bank.

The process of permitting haulers for each load of septage and tracking finances with Upper Blackstone put an additional administrative burden on Acton. As compensation for that burden the haulers were required to pay a surcharge for each pump within the community. This revenue was used to offset secretarial support within the Health Department and to fund the first data tracking system for septage pumping. At that time approximately 1,000 pumps were being recorded per year.

In addition to the pumping surcharge the Town also identified all other septic related revenues (Soil Testing, Plan Review, System Inspection) and made them part of the Enterprise Fund. With these funds the Town was able to finance the personnel necessary to perform all septic related functions and supply all materials appurtenant to their duties.

2.8 ALTERNATIVE ANALYSIS AND PREFERRED SOLUTIONS

Once the Needs Planning Areas were ranked and the solutions were identified, the CAC then assessed positive and negative criteria and implementation issues for potential off-site solutions. For example, centralized treatment depends on the capacity of the existing facility and satellite and cluster systems require suitable and available land.

The Project Team withheld estimating costs until alternatives were deemed technically feasible and implementable. The CAC expanded the Needs Criteria table to the matrix displayed in Appendix H as Table 2-7 – Needs and Solutions Criteria Matrix, which was used at multiple CAC meetings to track the progress of the study and recommendations of the CAC. Therefore, as the CAC discussed and evaluated the needs criteria and potential solutions, the table underwent several revisions. Table 2-7 represents the final version.

Table 2-8 summarizes the preferred solutions itemized in Table 2-7 (Appendix H), and lists the other applicable and viable solutions that can provide solutions to the Needs Planning Areas. The CAC's preferred solutions are a combination of structural and non-structural, ranging from extensions of the Middle Fort Pond Brook sewer system to construction of cluster units to development of Wastewater Management Districts. The CAC recommends that the means of wastewater disposal for areas outside of the Needs Areas remain as is, with onsite wastewater systems. The CAC recommended preferred solutions with the recognition that their preferences may be constrained by disposal capacity or other implementability issues. Therefore, the CAC developed a menu of feasible alternatives.

In Needs Planning Areas where cluster/neighborhood solutions are recommended the Wastewater Management Districts would work in conjunction with the cluster solution. The following section discusses in more detail the alternatives analysis that resulted in the preferred solutions.



Table 2-8: CAC's Preferred Solutions Matrix

Needs Area #	Description	Current Priority Status	Connect to Existing Sewers	Rank (1-4) with 1 being the preferred choice		
				Construct New WWTF/Sewers	Cluster System	Wastewater Management District
1	North Acton Village Marshall Crossing Robbins Brook	Medium	NA	3	1	2
2	Nagog Woods Acorn Park North Acton Condos	Low	NA	2	1	NA
3	East Acton Village Route 2A	High	NA	2	1	3
4	Concord Road Robbins Park	Low	NA	2	3	1
5	Brucewood Estates	Medium	3	NA	2	1
6	Brookside Circle	Low	2	NA	1	2
7	Powdermill Plaza ⁽¹⁾	High	NA	NA	NA	NA
8	Maynard Border	Medium	1 Maynard or Acton	NA	3	2
9	Heath Hen Meadow / Stow Street	Low	3	NA	2	1
10	Spencer / Tuttle / Flint	High	1	NA	NA	2
11	Nash / Downey Dover Heights	Medium	1	NA	2	3
12	West Acton Center	High	1	NA	2	3
13	Indian Village	High	1	3	4	2
14	Flagg Hill	Medium	NA	NA	2	1
15	Acton Center	Low	NA	2--East Acton	3	1

⁽¹⁾ Powdermill Plaza is connecting to the Middle Fort Pond Brook Sewer System



2.8.1 Alternatives Analysis - High Priority Needs Planning Areas

Figure 2-8 displays the preferred solutions for Needs Planning Areas. The three categories of solutions are Cluster/Neighborhood system, Wastewater Management District, and Connection to the Existing System.

Powdermill Plaza (7)

The CAC identified the Powdermill Plaza area (Needs Planning Area 7) as the highest priority area, with a preferred solution to connect to the Adams Street WWTF. The project is underway.

Spencer Road/Tuttle/Flint (10)

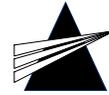
Through public meetings held in December 2005 and January 2006 residents voiced a preference to rank the Spencer/Tuttle/Flint area as a higher priority than West Acton Center and Indian Village for an off-site structural solution. The Spencer Road area residents provided anecdotal information in support of the severity of needs for alternative wastewater disposal. The preferred solution for this neighborhood is connection to the existing sewer. A secondary solution is to develop a Wastewater Management District with advanced onsite treatment systems.

West Acton Center (12)

The CAC's preferred solution for West Acton Center is to connect to the Middle Fort Pond Brook collection system. Further analysis of the West Acton Center was conducted to verify the needs analysis from Phase 1 and to assess the needs in relation to solutions, including the capacity limitations of the Adams Street WWTF.

As a neighborhood, West Acton Center exhibits geographic differences in needs. This can be represented conceptually by a line approximating the route of the railroad right-of-way (ROW) for the following reasons:

- The majority of lots highlighted by Phase 1 as needs parcels are to the east of the ROW, mainly due to the proximity of Middle Fort Pond Brook, which limits onsite wastewater systems due to wetlands and high groundwater limitations.
- In the area east of the ROW, over 50% of the developed parcels are classified as needs parcels. This is the second greatest percentage in the identified Needs Areas.
- The Gates and Douglas Schools share a parcel. The wastewater systems combined design flow for parcel flow averages just over 15,000 since 1998, based on water usage. Since 2002, water conservation measures and the variability in school populations have kept actual flow at approximately 6,330 gpd. Doubling of these numbers, based upon the alternate design flow calculation available to school facilities in 310 CMR 15.203(6) gives 12,660 gpd. According to Title 5, any on-site disposal system with a design flow over 15,000 is required to obtain a Groundwater Discharge Permit, pursuant to 314 CMR 5.00. If the design flow is between 10,000 gpd and 15,000 gpd an upgrade, with technology able to meet Class I Groundwater standards, from 314 CMR 6.00, is required if the system is in a nitrogen sensitive area, in failure, or flow increases.
- The Gates and Douglas School parcel exhibits high groundwater, but was not included in the Phase 1 mapping because of an inconsistency in the assessors data used for the GIS analysis. A new onsite wastewater disposal system would need a mounded disposal field.



- Since 1995, 13 properties in the West Acton area east of the ROW have replaced their systems. Of those, five required no variances to Title 5 or local regulations, four required variances to local regulations only, one required variances to Title 5 only, and three required variances to both Title 5 and local regulations.
- There are two Remedial Use Approval I/A systems in use in West Acton Center, both on commercial facilities.

In all likelihood, the Adams Street WWTF will not have the surplus capacity to sewer the entire West Acton Center area if this alternative is chosen by the community. Because parcels located adjacent to sewer lines are required to connect under current regulations, the pipeline route to serve Needs parcels would include adjacent parcels, which use available WWTF capacity. Therefore, a conceptual design phase for this option should include evaluating and refining the limits of possible sewer extensions based on the capacity limits.

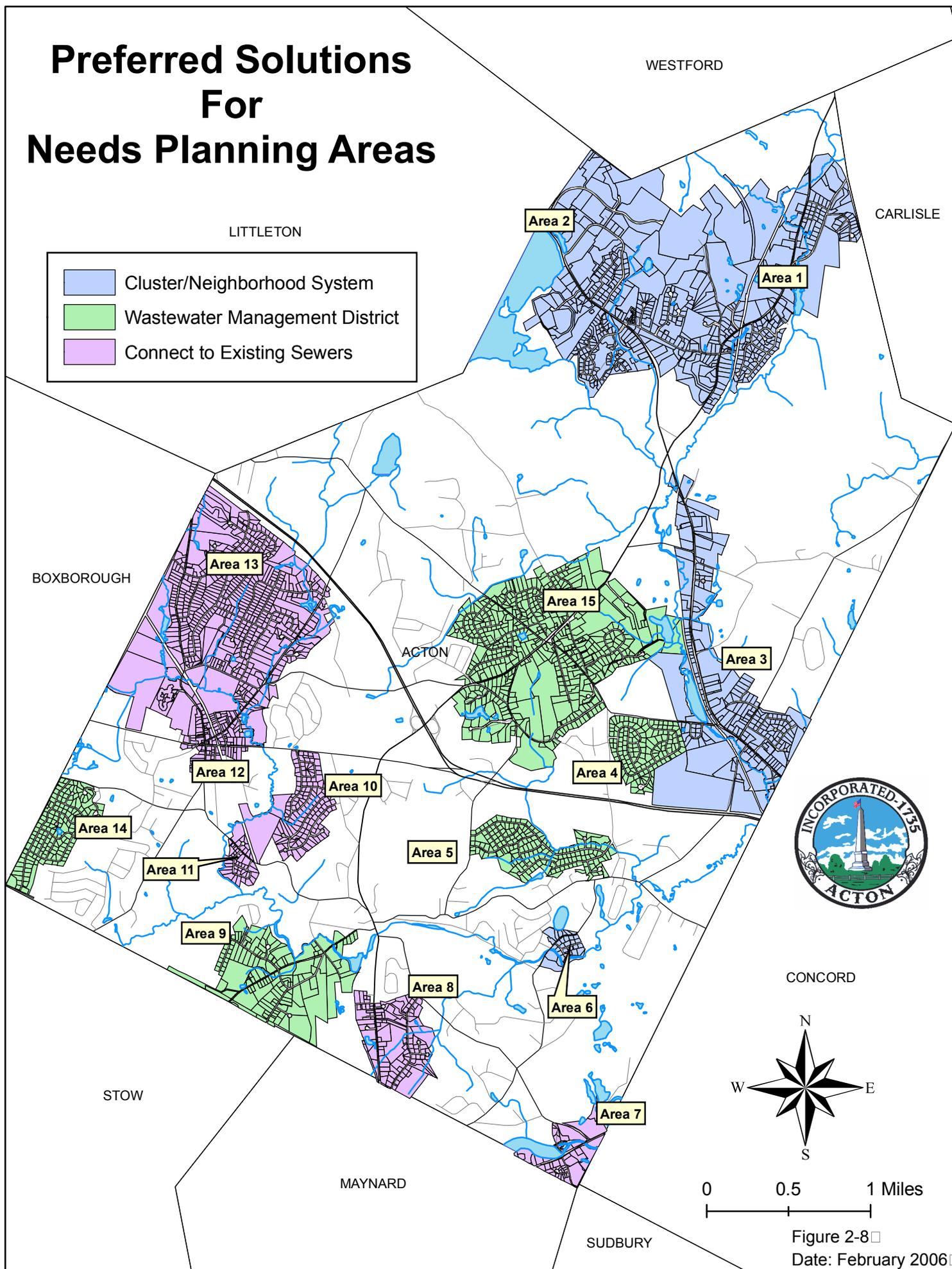
As a commercial center, the area is targeted for economic growth. But the center is also a village area, with historical interest, mixed (commercial/residential) use, and primarily residential streets outside of the main intersections. Therefore, the solutions for this area should reflect these differences.

Figure 2-9 shows that the West Acton Center Area is comprised of the area east of the railroad right-of-way (WAC-A), which includes the Gates and Douglas elementary schools, and the area west of the railroad right-of-way (WAC-B). This demarcation was selected for consistency as the study progressed and to acknowledge the differences within the Center, as well as the limitations of the disposal capacity at the Adams Street WWTF. The final delineation will be determined as the Town moves forward with additional public outreach during the conceptual design of a sewer extension.

Indian Village (13)

The preferred solution for Indian Village is to connect to the Middle Fort Pond Brook sewer system. However, the primary technical needs criteria are high groundwater and poor soils, which can be overcome by acceptable advanced technologies. Increased monitoring through a wastewater management district would protect the area from risks to the environment and public health. Though not as important as environmental and public health criteria, the CAC's concern regarding aesthetics would not be addressed unless an offsite solution is constructed.

Preferred Solutions For Needs Planning Areas



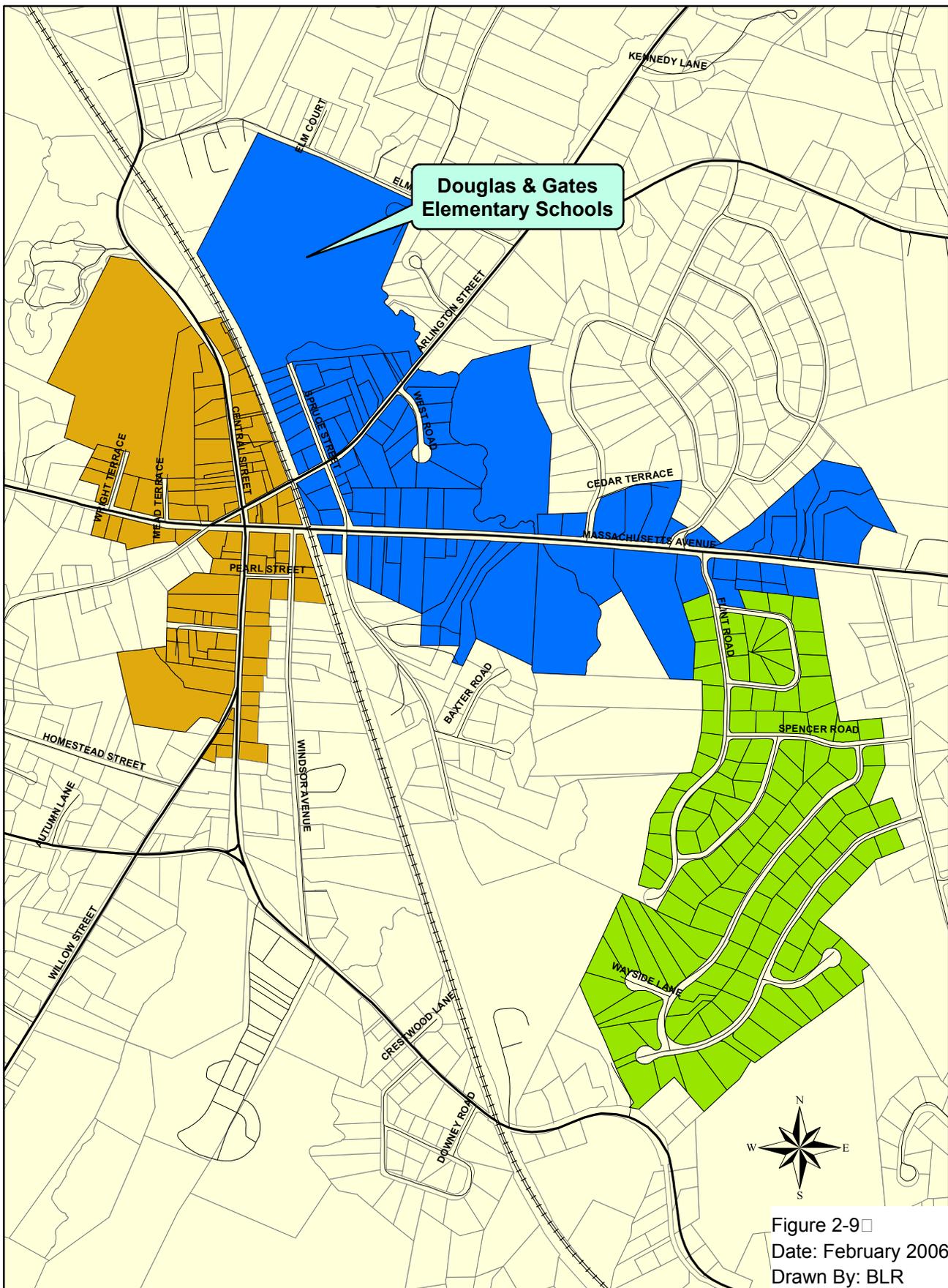
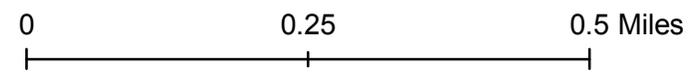


Figure 2-9
 Date: February 2006
 Drawn By: BLR



Proposed West Acton Sewer Extension Sectors





East Acton Village (3)

The CAC evaluated several alternatives for wastewater solutions in the East Acton (Area 3 and Area 4) area. The onsite hydrogeological study on the Wetherbee Street parcel showed promise for a disposal location. However, three factors influence this alternative:

1. The Wetherbee Street parcel has a legislated and deeded conservation restriction. In accordance with the deed, “According to the provisions of said Chapter 576, Acts of 1980, said land shall be used solely for conservation purposes, and shall be administered, controlled, and managed by the conservation commission of the town of Acton, and in the event it is not so used, title shall revert to the Commonwealth.” At public meetings held to review the CWRMP, Conservation Commission representatives expressed opposition to use of the land for wastewater treatment or disposal.
2. Residents in East Acton expressed a preference to keep a village atmosphere instead of extending commercial development along the Route 2A in a “strip” fashion. The East Acton Village Plan supports the integrity of the village while encouraging economic development.
3. Two private facilities (Suburban Manor and Farmbrook) with unused capacity are located in or adjacent to Needs Planning Area 3. Public/private and cluster solutions would support the village concept in East Acton. Therefore, development of cluster systems is the preferred solution in East Acton.

As shown in Figure 2-10, sand and gravel are common on many parcels in East Acton along Route 2A. These soils lend themselves to shared systems where neighbors can join for solutions. And, increased levels of treatment of systems with large disposal areas at the commercial properties could be modified to load the disposal areas at greater amounts. Permitting issues would have to be addressed if the flows exceed Title 5 limits.

2.8.2 Structural Solutions

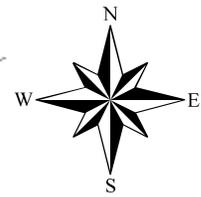
Maynard Border (8)

The preferred solution for this area is connection to either the Maynard or the Acton municipal wastewater systems. A connection with Maynard would require an inter-municipal agreement for Maynard to accept wastewater from Acton.

Nash and Downey Roads (11)

The Nash and Downey Roads preferred solution is to connect to the existing sewer because the Dover Heights system is greater than 15,000 gpd and will be required by regulatory statute to upgrade to a treatment facility. As a secondary solution, the Dover Heights system can be upgraded and combined with the neighborhood for a local cluster system.

0 750 1,500 Feet



East Acton Potential Disposal Locations



-  Zone I
-  Zone II
-  Sand and Gravel Deposits
-  Public Water Supplies
-  Area 3 - East Acton
-  Area 4 - Robbins Park

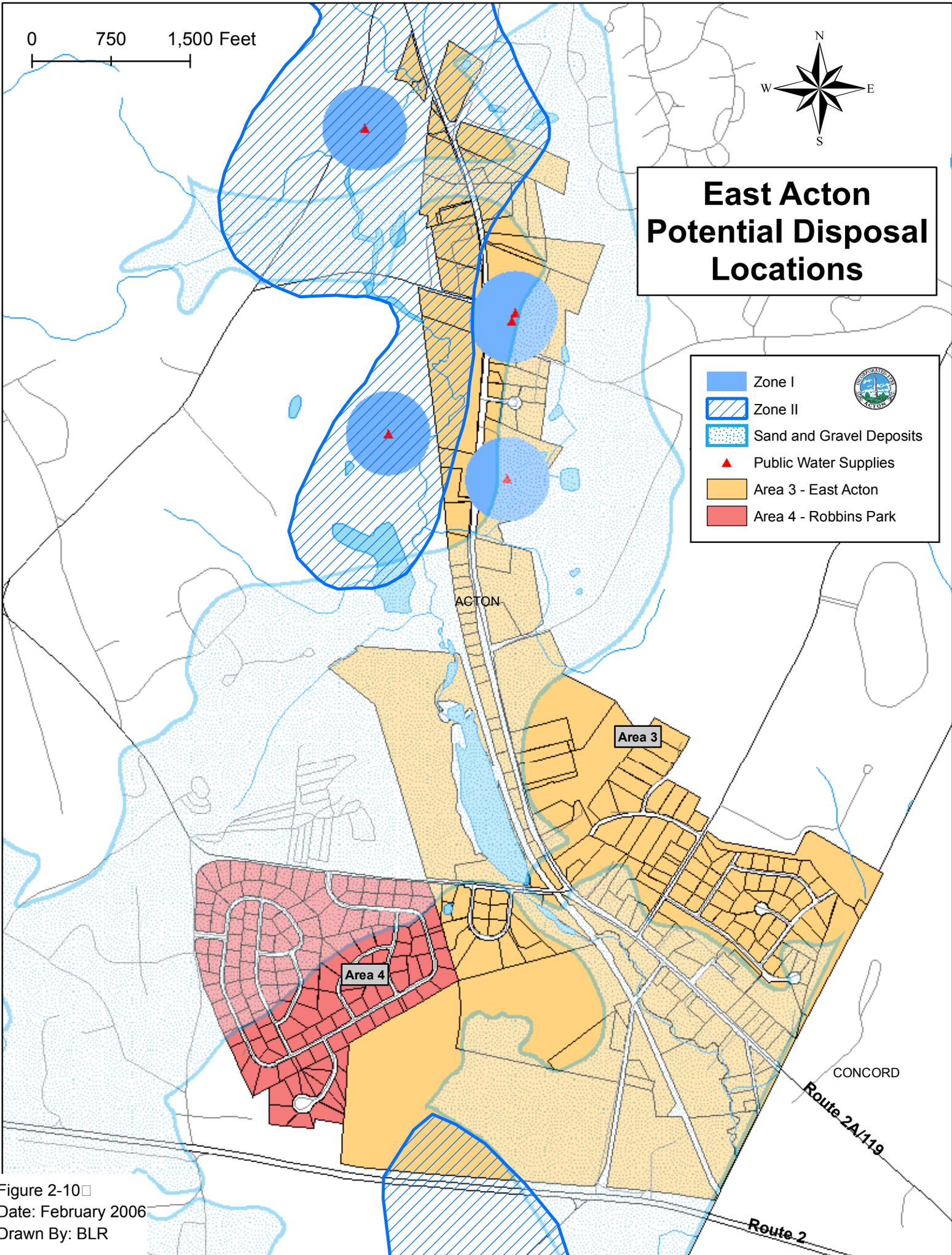


Figure 2-10 □
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2.8.3 Public/Private Partnerships and Cluster Systems

Based on our assessment of the nine existing private treatment facilities located within Acton, there are four facilities with capacity that potentially could be used in a public/private partnership in select areas. Each of the four facilities presented in Table 2-9 has over 10,000 gpd of unused capacity based on actual flows reported to DEP for the 2005 reporting period.

Table 2-9: Private Wastewater Treatment Facilities with Unused Capacity

Facility Name	Location	Permitted Flow (gpd)	Actual Flow (2005) (avg. gpd)	Available Capacity (gpd)
Robbins Brook	10 Devon Drive	34,520	6,675	27,485
Acorn Park	400 Acorn Park Drive	39,750	16,070	23,680
Suburban Manor	1 Great Road	24,450	10,530	13,920
Farmbrook	Davis Road	105,000	68,590	36,410

The Robbins Brook actual flow does not include flow from an additional 45 2-bedroom (55+) units to be constructed.

Figure 2-11 shows these four private facilities in relation to Needs Planning Areas. Of the 15 Areas, nine Areas are recommended for cluster-type systems as either the primary or the secondary preferred solution. Of these nine Areas, three are located within close proximity to existing private facilities with available capacity.

1. Portions of East Acton (Area 3)

Portions of High Priority Needs Planning Area 3 (East Acton) could be served by Suburban Manor or Farmbrook to complement the recommendation for cluster systems.

2. Marshall Crossing / Robbins Brook (Area 1)

This Area is the location of a private treatment facility at the Robbins Brook Assisted Living Facility.

3. Nagog Woods/ Acorn Park / North Acton Woods (Area 2)

The descriptive name for this area highlights the number of developments with private treatment facilities. A cluster solution could include a potential tie-in to Acorn Park or the new development at the Woodlands.

The Town of Acton has attempted to collaborate with private facilities in the past, but has not successfully implemented an agreement. The Town would encourage this solution as a feasible alternative that may optimize the operation of private facilities or enable the public ownership of private facilities.



Cluster Systems as Secondary Solutions

In addition to the three Areas located in close proximity to existing underutilized private facilities there are six other Areas that have been selected by the CAC for cluster/neighborhood or shared systems as a secondary solution:

- Brucewood Estates (Area 5)
- Brookside Circle (Area 6) – Has an existing WWTF that should remain in operation.
- Heath Hen Meadow (Area 9)
- Nash and Downey Roads (Area 11) – Dover Heights WWTF should be upgraded.
- West Acton Center (Area 12)
- Flagg Hill (Area 14)

Needs Planning Areas Adjacent to Surplus Package WWTF Capacity

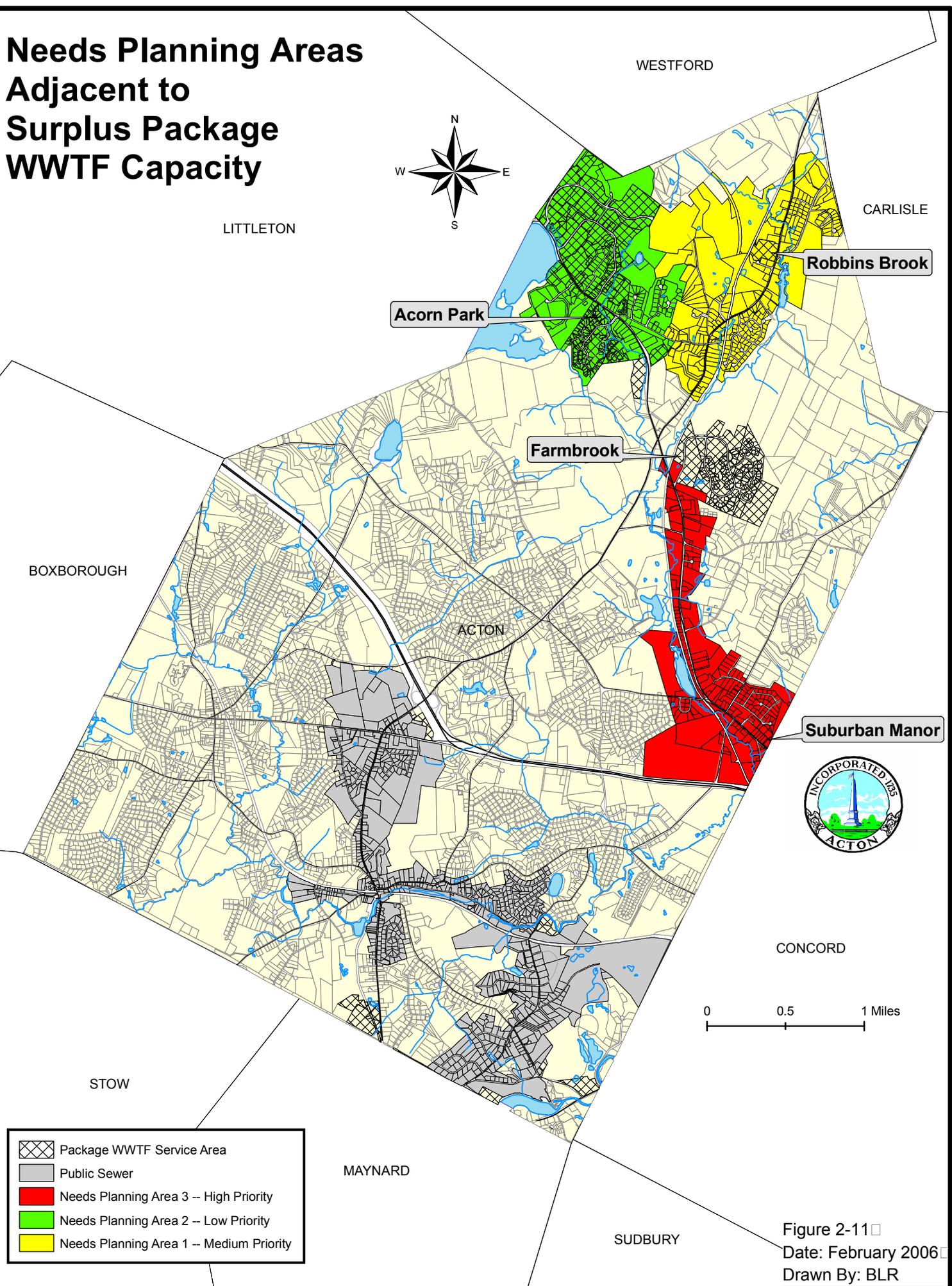


Figure 2-11 □
Date: February 2006 □
Drawn By: BLR



2.8.4 Wastewater Management Districts

Multiple Needs Planning Areas have been identified by the CAC and Project Team through the CWRMP process as being preferred areas for implementation of Wastewater Management District(s) as a primary or secondary solution. Of the 15 Areas, 11 are recommended for a WWMD as either the primary or the secondary preferred solution.

Primary Solution Needs Planning Areas:

- Robbins Park (4)
- Brucewood Estates (5)
- Brookside (6)
- Heath Hen Meadow (9)
- Flagg Hill (14)
- Acton Center (15)

These areas all share the common criteria of high groundwater, where mounded systems may be suitable, especially if paired with advanced technologies to reduce leach field size and groundwater separation. These types of onsite wastewater systems lend themselves to increased management that could be provided by a Wastewater Management District.

The Areas preferred for other solutions, but with WWMDs as the secondary solution, have other local alternatives that may be more beneficial to the Town, either through an existing treatment facility with available capacity or within close proximity to centralized sewers. These areas are:

- Marshall Crossing / Robbins Brook (1)
- Maynard Border (8)
- Spencer Road/Tuttle/Flint (10)
- West Acton Center A and B (12)
- Indian Village (13)

As described in previous sections, Wastewater Management Districts provide greater levels of environmental protection, in proportion to the level of environmental risk, while allowing property owners to retain the use of onsite wastewater systems as their disposal option. As a non-structural solution, a WWMD allows the Town to increase the level of public health and water resources protection afforded to the community without a significant capital expenditure.



3. DEVELOPMENT OF THE RECOMMENDED PLAN

3.1 TECHNICAL SOLUTIONS

The recommended solutions include a combination of the following:

- Continued reliance on onsite wastewater systems (do nothing) under the existing management framework for the majority of Acton,
- Continued reliance on onsite wastewater systems but with a town-driven management system that includes expanded monitoring and stricter treatment standards,
- Cluster collection and treatment systems,
- Expansion of the Middle Fort Pond Brook sewer system with treatment and disposal at the Adams Street treatment facility to address high priority areas and optimize the operation of system,
- Use of existing in-town private treatment facilities, and
- Continued monitoring of new technologies and opportunities over the course of the 20-year planning period for new solutions.

The current wastewater disposal system for the majority of the parcels in the Town of Acton will remain unchanged.

3.1.1 Middle Fort Pond Brook Sewer System Evaluation

The CAC recommended preferred solutions with the recognition that their preferences may be constrained by disposal capacity. The Project Team assessed the available capacity in the Middle Fort Pond Brook collection system using the CAC's preferences as a guide.

Excluding Area 7, Powder Mill Plaza, which is moving forward with design and construction, the CAC's preferences for sewer system expansion are:

- Area 10: Spencer Road / Tuttle / Flint / Mallard
- Area 11: Nash / Downey Roads
- Area 12: West Acton Center
- Area 13: Indian Village

Also, Area 8 - Maynard Border, could be connected to the Maynard collection system or Acton's system.

W&C reviewed the sewer system termination points and evaluated the best downstream routes given the designed capacity of the system. Excluding the High Street Extension, which is underway, connections to serve Needs Planning Areas could be made at:

- Central Street (direct route to Pump Station 1)
- Prospect Street (Pump Station 3 to Pump Station 4 to Pump Station 1)
- Mass Ave (Pump Station 4 to Pump Station 1)



By observation and preliminary flow assessment, Area 11 (Nash / Downey) and Area 13 (Indian Village) cannot be supported by the existing treatment and disposal infrastructure. These areas are located to the north and west of Area 10 and Area 12. Therefore, Area 10 and Area 12 would be sewered before sewerage Area 11 or Area 13, using any existing surplus treatment and disposal capacity. This evaluation was performed for the total remaining area (Spencer Road /Tuttle/Flint, West Acton Center-A and West Acton Center-B) and for a down-sized sewer extension (Spencer Road /Tuttle/Flint and West Acton Center-A). The capacity of the downstream pump stations (Pump Stations 3 and 4) were evaluated since Pump Station 1 has sufficient capacity for the projected flows.

Table 3-1 shows that the total area's estimated wastewater flow, based on winter water usage, is 56,300 gpd, but the down-sized sewer extension flow is 39,100 gpd. The reason for the down-sized extension is that the Adams Street Wastewater Treatment Facility current surplus capacity is 43,000 GPD once the High Street sewer extension is complete. Sewering the entire West Acton Area could exceed this capacity and therefore require an upgrade to the facility and increased disposal capacity.

3.1.1.1 Evaluation of Middle Fort Pond Brook Collection System Capacity

Table 3-1 summarizes the results of the evaluation that involved estimating the average daily flow (ADF) for the proposed sewer extension, adding it to the current design ADF for each pump station, applying a peaking factor, and comparing this peak hourly flow rate to the pump station capacity. As presented in the Table, Pump Station 3 does not have adequate capacity but Pump Station 4 does have adequate capacity.

Table 3-1: Evaluation of Downstream Pump Station Capacity

		Spencer/Tuttle/Flint and West Acton Center-A			Spencer/Tuttle/Flint, West Acton Center-A and West Acton Center-B		
		Average Daily Flow	Peak Factor ²	Peak Hourly Flow	Average Daily Flow	Peak Factor ²	Peak Hourly Flow
Proposed West Acton Flow¹	GPD	39,100			56,300		
Pump Station 3							
Existing Design Flow	GPD	49,500			49,500		
Totals with West Acton Flow	GPD	88,600	3.20	283,500	105,800	3.20	338,600
Pump Station Peak Capacity	GPD			216,000			216,000
Pump Station 4							
Existing Design Flow³	GPD	91,900			91,900		
Totals with West Acton Flow	GPD	131,000	3.20	419,200	148,200	3.20	474,200
Pump Station Peak Capacity	GPD			864,000			864,000

1. Proposed West Acton Flows are based on highest winter water use from 2001-2004.
2. Peak Factor is based on design peak factor for pump station number 3.
3. Existing design average daily flow to pump station number 4 calculated as the total of the design flow for pump station 3, pump station 5 and the 110 lots that flow by gravity to pump station number 4 (assuming 4 person/lot and 70 gallons/capita day).



Pump Station 4 has a peak capacity of approximately 860,000 gpd, which exceeds the projected wastewater flow of approximately 419,200 gpd. Pump Station 3, however, has a peak capacity of 216,000 gpd, which is less than the projected wastewater flow to the station.

Therefore, sewer extensions can be installed in Central Street to connect to the gravity sewer at High Street and River Street to be conveyed by gravity to Pump Station 1 or connected in Mass Ave for conveyance to Pump Station 4.

3.1.2 High Priority Areas

The five high priority areas are all addressed through viable and implementable plans. The Project Team and CAC recommend extension of the Middle Fort Pond Brook sewer along High Street to Powdermill Plaza (Area 7), Spencer Road/Tuttle/Flint neighborhood (Area 10), and West Acton Center – A (Area 12). The capacity of the treatment disposal beds currently limits the sewer extensions beyond these areas, limiting the sewer alternative. However, feasible solutions are available for West Acton Center – B (12), Indian Village (13), and East Acton Village (3), through implementation of Wastewater Management Districts and use of individual or shared advanced treatment systems.

3.1.2.1 Powdermill Plaza – High Street (7)

The High Street Extension Project is expected to be constructed in summer 2006. This project is intended to allow the decommissioning of the Powdermill treatment facility while servicing the remaining properties in the southeast corner of Acton.

Figure 2-6 shows the project's features, including a pumping station at the intersection of High Street and Powdermill Road (Route 62) initially intended to service both Powdermill Plaza and Acton Ford but with the future capacity for a tributary area including Knox Trail, Old High Street, portion of Powdermill Road (Route 62), and Sudbury Road.

The High Street sewer extension is entirely funded through a financial gift to the Town of Acton given by private sources (Atlantic Management & Acton Ford). The gift is the result of 3 years of negotiations and is memorialized in a Memorandum of Agreement between the private parties and the Town of Acton.

A clause in the Agreement provides that the privately funded project includes infrastructure and flow capacity for the three lots on High Street that abut the project because they have frontage along the route of infrastructure. The Agreement also provides a clause that the private parties will furnish three low pressure grinder pumping units for the three project abutters. The grinder pumping units will be stored at the Acton WWTF until the abutters are ready to connect into the public sewer system. The three abutters are responsible for the cost of installing and wiring the grinder pumping units and the pipe from the units to the service connection at their property line. Abutters are also responsible for the fee associated with the connection to the public infrastructure.

The project has been bid and the results are under review.

3.1.2.2 West Acton Center – A (12) & Spencer/Tuttle/Flint (10)

The proposed sewer layout includes extensions to the Spencer/Tuttle/Flint (STF) Area and West Acton Center-A (WAC-A). Four conceptual sewer configurations were developed for sewerage the area. The conceptual configurations were developed utilizing a topographic map with 10-foot interval contours,



generated from the Town's GIS data base. The primary parameters followed in developing the configurations were to minimize sewer depth and number of pump stations. The objective of minimizing sewer depth was done for two reasons:

(1) Deep sewers increase the initial installation costs due to:

- greater amount of excavation, backfilling and compaction;
- higher likelihood of encountering bedrock;
- higher likelihood of encountering unsuitable materials;
- increased amount of excavation dewatering; and
- increased width of trench excavation which impacts adjacent existing utilities, roadway pavement repair, and traffic control requirements.

(2) Deep sewers are more difficult to access for maintenance.

The objective of minimizing the number of pump stations was done because pump stations add capital, operations and maintenance cost to the sewer system. Invariably, in laying out a sewer system, there are locations that cannot be served without installing either deep sewers or a pump station. Therefore, selecting a concept ultimately becomes a task of balancing the depth of sewer against the number of pump stations, and using cost effectiveness and engineering judgment to determine the best option.

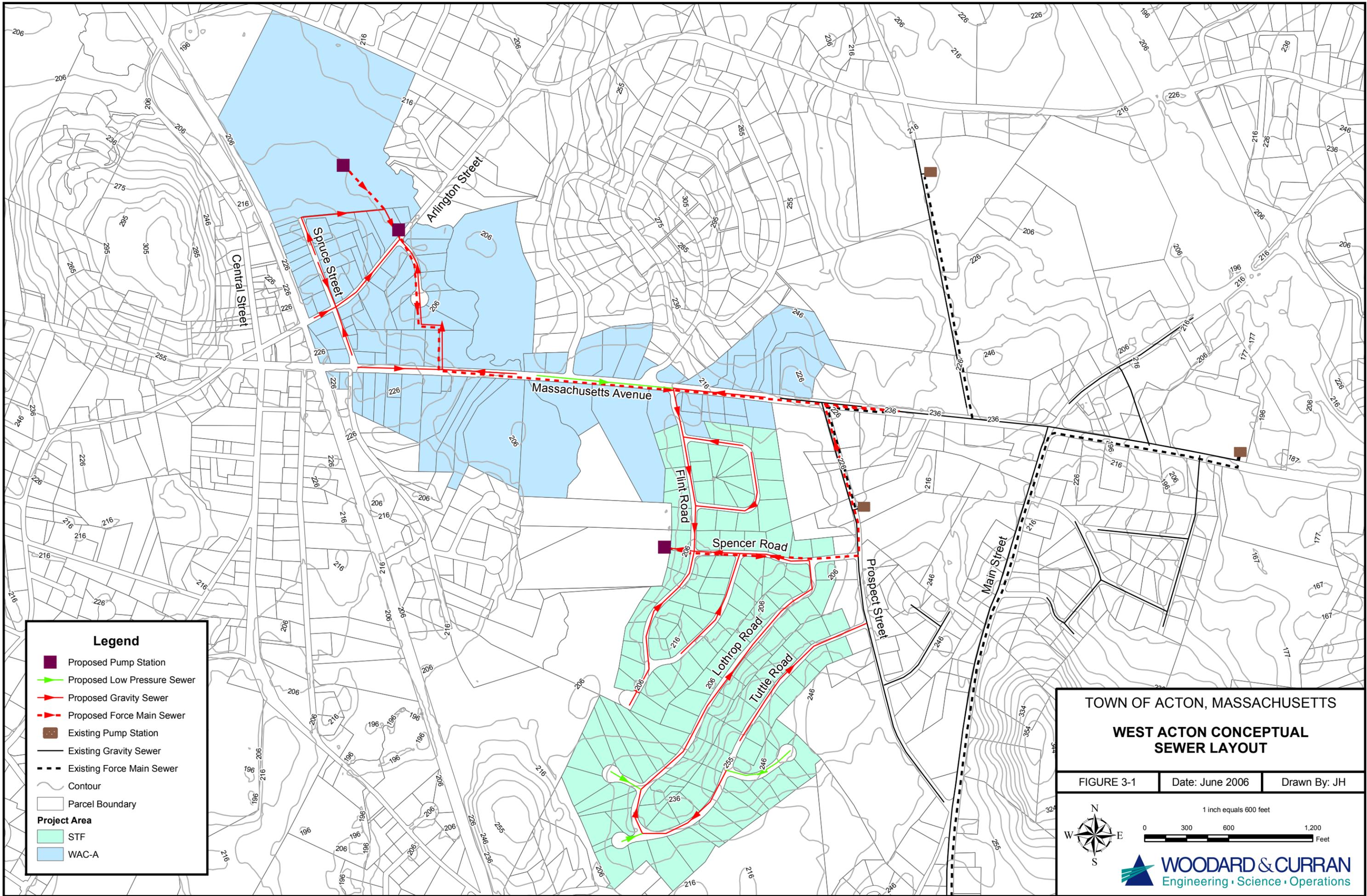
The approach taken in developing the conceptual layouts was to first develop one layout that had only one pump station which consequently resulted in significantly deep sewers. Next, by trial and error, three additional layouts were developed with increased numbers of pump stations resulting in fewer locations with deep sewers. The layout presented as the proposed layout was selected because it had a reasonable number of pump stations (three plus a pump station to serve the schools) with no sewers over 20 feet and deep and only 1,600 linear feet of sewer (approximately seven percent of the total) over 16 feet deep.

All of the layouts included some streets that are proposed to be served by low pressure sewers. Low pressure sewer was proposed in locations on the periphery of the sewer area, where the ground surface slopes away from the slope of the gravity sewer.

Figure 3-1 shows a conceptual sewer design for the Spencer / Tuttle / Flint area, and West Acton Center – A. The proposed layout shown in Figure 3-1 includes 16,700 feet of gravity sewer, three new pump stations (one pump station to serve the schools), 7,200 feet of force main, and 1,850 feet of low pressure sewer with 19 buildings requiring grinder pumps.

Spencer/Tuttle/Flint Area (Area 10)

The STF area has one proposed pump station located to the west of the intersection of Spencer Road and Flint Road, on a Town-owned property behind the residential lots that front Flint Road. The pump stations and pipelines are located to minimize impacts of construction and use on wetland resource areas, and environmentally sensitive areas. A 200-foot cross-country sewer would be required on an easement to connect the sewer on Flint Road to the pump station site. The entire STF site would be directed to this pump station with the exception of the northern end of Tuttle Drive which would flow by gravity to the existing sewer on Prospect Street. The pump station would pump wastewater to the existing sewer on Massachusetts Avenue. The eastern side of WAC-A would also be directed to this pump station. The entire area would be served by gravity with the exception of Torrington Lane, Wayside Lane, and the cul-de-sac on the southern end of Tuttle Drive which would be served by low-pressure sewers.



Legend

- Proposed Pump Station
- Proposed Low Pressure Sewer
- Proposed Gravity Sewer
- Proposed Force Main Sewer
- Existing Pump Station
- Existing Gravity Sewer
- Existing Force Main Sewer
- Contour
- Parcel Boundary
- Project Area**
- STF
- WAC-A

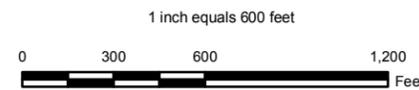
TOWN OF ACTON, MASSACHUSETTS

WEST ACTON CONCEPTUAL SEWER LAYOUT

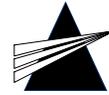
FIGURE 3-1

Date: June 2006

Drawn By: JH



WOODARD & CURRAN
Engineering • Science • Operations



West Acton Center-A Area

The WAC-A Area has two proposed pump stations; one located on Arlington Street on Town-owned property, and one on the Douglas and Gates School property. The pump station on the School property would be dedicated to serving the schools. The pump station on Arlington Street would receive all the wastewater from WAC-A area, with the exception of the properties on Massachusetts Avenue, east of Middle Fort Pond Brook which would flow to the SFT Area. The pump station would pump wastewater to the existing sewer on Massachusetts Avenue. The entire area would be served by gravity sewers. A 700-foot easement would be required for a cross country sewer from Massachusetts Avenue to West Road.

The layout would require two cross-country sewers through easements totaling 900 linear feet. The other major cost components of the layout include a stream crossing within Route 111 and 5,000 linear feet of work within the Route 111 state highway right of way.

3.1.2.3 West Acton Center-B (12) & Indian Village (13)

West Acton Center-B Area

The primary technical needs criteria for WAC-B is lot size, which relates to the non-technical criteria of economic development. The Acton Master Plan and Planning Board set goals for economic vitality in the Village areas, including West Acton Center. Standard on-site solutions are technically viable for most of this area, though managed innovative/alternative systems are needed on some lots to overcome size limitations. Residents have expressed a preference to maintain growth within the village character. Some shared systems may be desirable to provide growth opportunities within the village framework.

We also evaluated potential sewerage alternatives for West Acton Center-B, though we do not recommend this alternative unless the delineation of WAC-A and WAC-B changes due to new information or initiatives. Sewering the WAC-B Area would require one pump station located on Central Street on Town-owned property. The pump station would receive all wastewater from the WAC-B area, with the exception of the northern end of Central Street which would flow by gravity directly to the WAC-A Area. The pump station would pump wastewater to the gravity sewer that connects to the WAC-A Area. A 400-foot easement would be required for a cross-country sewer from Central Street to Spruce Street that connects WAC-B to WAC-A. This cross-country connection also requires a railroad crossing which would require pipe-jacking under the railroad tracks.

Indian Village

The preferred solution for Indian Village is to connect to the Middle Fort Pond Brook sewer system, although a combination of the ranking of this Needs Planning Area and capacity constraints eliminate this alternative unless a new disposal location is developed. Parcel size should be suitable for mounded on-site systems.

3.1.2.4 East Acton Village (3)

The recommended solution for East Acton Village is to encourage and facilitate construction of shared or cluster treatment systems. These treatment systems will address the Area's technical needs by providing the protection that conventional septic systems do not. Shared and cluster systems provide the balance needed to achieve the goal economic growth while maintaining the village character.

The Town can facilitate this approach by granting local variances in exchange for higher treatment levels. Town-owned cluster systems are a possibility in addition to privately financed and managed systems.



Municipal ownership avoids the financial and contractual agreements required as part of privately held shared systems.

3.1.3 Cluster Systems

The cluster systems recommendations mirror the CAC's preferred solutions. These Needs Planning Areas have existing private treatment facilities with unused capacity that could possibly be tapped for municipal use:

- Marshall Crossing / Robbins Brook (Area 1)
- Nagog Woods/ Acorn Park / North Acton Woods (Area 2)
- East Acton Village (Area 3)

Though the focus of Area 1 is to institute a Wastewater Management District, the local facility does hold some opportunity for a private-public partnership. The focus of the Brookside (Area 6) area should be to create shared systems in addition to the existing treatment facility that should remain in service. In addition, capacity limits in the existing system preclude the connection of the Nash and Downey neighborhood and Dover Heights (Area 11). Therefore, the Dover Heights treatment facility should be upgraded to meet current regulations and the area should focus on cluster solutions, including a potential public-private solution at Dover Heights.

3.1.4 Wastewater Management Districts

As shown in Table 3-2 the implementation of Wastewater Management Districts in Acton can be structured in such a way as to allow the citizens a menu of options available for the management of the almost 2300 parcels that could potentially continue to be serviced by onsite wastewater systems. This presentation of options is important because it allows an adaptive management style that balances the need to mitigate environmental and public health risks from onsite wastewater systems with financial and operational responsibilities placed upon system owners. This method also builds on the system already in place.

In addition to the High Priority Areas recommendations for Wastewater Management Districts in West Acton Center-B and Indian Village, the recommended Wastewater Management Districts are:

- Marshall Crossing / Robbins Brook (Area 1)
- Robbins Park (Area 4)
- Brucewood Estates (Area 5)
- Maynard Border (Area 8)
- Heath Hen Meadow (Area 9)
- Flagg Hill (Area 14)
- Acton Center (Area 15)



Table 3-2: Examples of Range of Wastewater Management District Options

	Present Management System	WWMD Option 1	WWMD Option 2
Septic Tank Pumping	Regulations require residential tanks to be pumped once every two years and commercial tanks to be pumped once per year.	Keep same interval, increase enforcement, provide financial assistance to qualified homeowners Function check required at each pumping, reported to BOH on official form	Keep same interval, homeowners will pay a user fee to the Responsible Management Entity (RME) which will provide the regular pumping services at the required intervals Function check required at each pumping, reported to RME on official form
System Inspection	Systems inspected as required in 310 CMR 15.300: change in ownership, use, or other specific circumstances	Systems with a design flow greater than or equal to 2000 gallons per day required to be inspected once every three years Systems with a design flow less than 2000 gallons per day required to be inspected once every five years Financial assistance available to qualified homeowners	All systems required to be inspected once every three years. Inspection costs will be covered by the user fee paid by the system owner
System Design	Board of Health regulations are more stringent than 310 CMR 15.000 for wetland setbacks, loading rates, depth of aggregate, and groundwater separation (only in aquifer protection zones)	System design criteria will be tied to a Performance Standard to prevent degradation of the receiving environment. The Performance Standard will be assigned to each parcel based upon the environmental risk or public health of a conventional onsite wastewater system. Each system owner must prove through the design process that their selected design meets the appropriate performance standard, or why the standard should not apply to their property	System design criteria will be tied to a Performance Standard, which is more protective than Option 1, to prevent degradation of the receiving environment. The Performance Standard will be assigned to each parcel based upon the environmental risk or public health of a conventional onsite wastewater system. Each system owner, through the design process must prove that their selected design meets the appropriate performance standard, or why the standard should not apply to their property.



	Present Management System	WWMD Option 1	WWMD Option 2
Use of I/A Technology	<p>System owner chooses to use technology for the benefits afforded in General or Remedial Use Approvals.</p> <p>Board of Health may require technology use as “Equivalent Environmental Protection” under the provisions of 310 CMR 15.40</p>	Use of I/A technology may be required to meet performance standards	Use of I/A technology will be required to meet performance standards
O&M of I/A Technology	System owner responsible for contracting with approved provider. BOH monitors contracts and compliance results.	System owner responsible for contracting with approved and locally licensed providers. System owner must maintain a yearly operations permit with the BOH. O&M governed by local BOH regulations.	<p>RME will provide all O&M, compliance monitoring, and compliance reporting for I/A technology systems.</p> <p>System owner costs will be incorporated into user fees.</p>



3.1.4.1 Wastewater Management Districts – Measuring Effectiveness

Implementation of greater levels of onsite wastewater management through Wastewater Management Districts is, by itself, an environmental benefit. Acton has a unique opportunity to evaluate the effectiveness of wastewater management districts in protecting valuable water resources using the Health Department's surface water quality surveillance program of 50 sites across the community's surface water network.

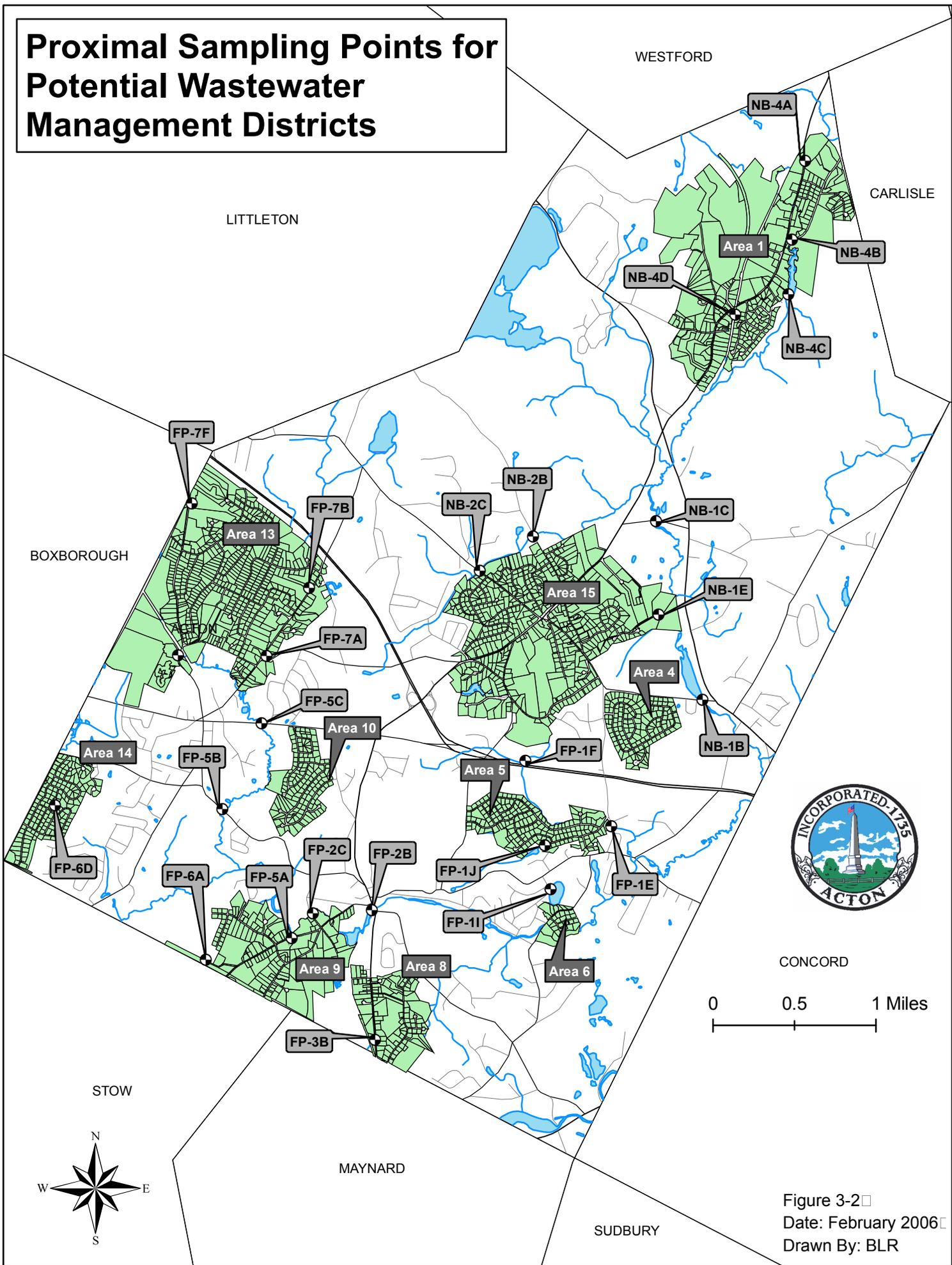
The availability of surface water quality monitoring points with established baseline conditions will provide the Town of Acton with the opportunity to evaluate the effectiveness of wastewater management district implementation by measuring the changes in surface water quality parameters, specifically fecal coliform species of bacteria. In the long term, this method of evaluation will allow the Town to adapt specific management practices, like the effluent performance standards, to provide the greatest levels of environmental protection.

Foundation for the Future

Through the utilization of the existing surface water quality surveillance network for an evaluation of the environmental protection effectiveness of the Wastewater Management District(s) the Town of Acton is laying the foundation for integrated water resources management on a localized scale. The surface water sampling points have already been converted into Small Scale Microwatersheds (SSMWs), and those SSMWs have been adapted into tools for more effective management of stormwater. Wastewater Management performance standards could be built upon the environmental needs of the individual SSMWs, and developed to supplement any existing stormwater regulations. Eventually, this can lead to the creation of Water Resource Management Districts where the localized hydrologic cycle is holistically managed, including discharges, withdrawals, and pollution prevention.

Figure 3-2 shows how the surface water sampling points can be used to monitor the water quality of upstream Needs Planning Areas that may be converted to Wastewater Management Districts. The figure includes Areas with priority recommendations and secondary recommendations for Districts to highlight the numerous opportunities to tie sampling locations to water quality monitoring in the Districts.

Proximal Sampling Points for Potential Wastewater Management Districts



CONCORD

0 0.5 1 Miles

Figure 3-2
 Date: February 2006
 Drawn By: BLR



3.2 FINANCING AND COSTS

3.2.1 Sewer Extensions

In implementing its first sewer infrastructure in 2002 Acton used progressive measures to finance the project. These measures were enacted to ensure sustainability of the proposed project, as well as any future projects. Sustainability was addressed in the following ways:

- The intended users would fully pay for the cost of the infrastructure, with the exception of costs that provided services for the entire Town (archaeology, traffic control, etc.).
- Allocation of costs would be based not on the present uses of properties but on the zoning potential of each property.
- Cash flow would be managed through gifts, or other revenue streams that would be repaid at the end of the project.
- State Revolving Funds (SRF) would be utilized to finance the construction to not only reduce interest rates but to extend repayments through thirty years.
- Estimated Betterments, which allow the Town to charge 50% of its costs to the users prior to completion of the project, would also be used to assist in cash flow of the project
- Public facilities within the service area would pay their avoided costs (cost of on-site solutions) spread out over the 30 year payback of the project.
- The infrastructure would be built to accommodate future users and the costs of that expansion capacity would be deferred to the future users.

3.2.1.1 Previous Wastewater System Financing Program

All of these measures were successfully implemented during construction of the first sewer infrastructure. Design of the system began in the fall of 1999 and construction began in the summer of 2000. The SRF was accessed. Repayment of the initial loans began in the fall of 2000 and the Town was able to use a \$500,000 gift to offset the loan repayments.

In 2001 the Town instituted Estimated Betterments which repaid the \$500,000 gift, as well as the SRF repayments. When construction was completed in 2002 the Town had generated a cash flow that would sustain the repayments through the contract resolution period. After an extended period of contract negotiations the Town issued Final Betterments in the summer of 2005. The final betterments were able to be allocated at less than a \$12,500 assessment for a single family home. Thus far, the repayment rate on betterments is similar to the payment rates on general tax obligations (97%).

In part to address accommodating future users, the Town in 2005 presented operating evidence which proved that the capacity of the wastewater system could be increased from 250,000 gallons per day (gpd) to 299,000 gpd. This increased capacity allows the Town to address needs areas identified by the CWRMP and to offset the costs identified in the initial project as expansion related.

3.2.1.2 Sewer Extension Costs

Design and Construction (Capital) Costs

Our estimate of conceptual level costs for the extension of the sewer system to West Acton is based on recent bid tabulations and experience with similar projects. Recent construction costs have escalated at historic rates, which have caused estimators to increase the contingency in costs estimates and to hold



estimates for shorter periods. Contingency is carried to reflect the amount of uncertainty in the estimate. At this level of planning, costs are conceptual in nature and cannot account for issues such as unsuitable subsurface conditions and other data gaps. We also assumed the project will be bid and constructed beginning in 2008. Table 3-3 provides a summary of the budgetary costs.

The Schools' portion of the capital costs is the avoidance cost, or cost to construct and alternative treatment system. A simple and economical treatment technology is a rotating biological contactor (RBC). Therefore, we based the budgetary costs for a treatment facility on an RBC system housed in a separate building. Based on the existing soils, a mounded disposal area is needed.

Table 3-3: Estimated Design and Construction Costs for Sewers to STF and WAC-A

Description	Contingency 15%	Contingency 30%
Estimated Construction Cost	\$5,540,000	\$5,540,000
Contingency	\$800,000	\$1,600,000
Engineering (25%)	\$1,400,000	\$1,400,000
Legal, Police Details, Bonding, etc. (5%)	\$300,000	\$300,000
Overall	\$8,040,000	\$8,840,000
Town Contribution for Schools	\$850,000	\$850,000
Overall without Schools	\$7,190,000	\$7,990,000
Per Parcel (gross estimate)	\$ 32,000	\$ 36,000

This cost is provided as a reference. Actual costs will be apportioned according to the Sewer Assessment Bylaw. The average cost per parcel in the Middle Fort Pond sewer district was \$33,000, with a single family residential assessment of \$12,500 per parcel. Therefore, per parcel design and construction costs are comparable to the Middle Fort Pond Brook system.

The per parcel estimate is an estimate taken by dividing the costs by the number of properties and is presented here to provide a baseline indication of overall project costs. However, Acton's betterment assessment is not calculated on a per lot basis, instead using a method based on use. Therefore, the actual cost per parcel will vary and be dependent on actual use and will be determined as part of the design phase.

The Engineers opinion of conceptual-level costs for design and construction of the sewers to Spencer / Tuttle / Flint (Area 10) and West Acton Center-A (Area 12) is between \$8 million and \$9 million under this scenario. Additional sewerage to sections of West Acton Center-B would naturally increase this cost, as could other sewerage configurations. Final analysis will be conducted during the preliminary design and final design phases. With long-term (life cycle O&M) costs included, the present worth of the West Acton sewer extension is estimated to be between \$9.0 million and \$10 million.

Average Annual Cost

Average annual costs, assuming financing charges, per parcel are summarized in Table 3-4. The average annual costs assume even distribution of costs per parcel, which will not occur because of Acton's Sewer Assessment Bylaw. Costs are calculated based on a 30-year term because Acton has financed the MFPB system over 30 years.



The calculation of annual costs follows the DEP's *Guide to Comprehensive Wastewater Management Planning* (January 1996), using a 5% discount rate without inflation. The present worth of life cycle costs is added to the capital costs, and the equivalent uniform annual cost over 30 years is calculated. The Town of Acton has a private contract for its wastewater system O&M. Therefore, the O&M costs for the recommended sewer extension were determined based on the current contract terms. We calculated the average annual costs for new users in the recommended sewer extension area, excluding the schools to avoid skewing the data significantly. We separately compare the costs for the schools to connect to the system or build and operate a dedicated WWTF.

Table 3-4: Estimated Annual Costs for Sewer Extension (Excluding Schools)

Description	Contingency 15%	Contingency 30%
Present Worth of Capital Costs	\$7,182,000	\$8,012,000
PW of O&M (fixed and variable)	\$900,000	\$900,000
PW of Equipment Replacement	\$165,000	\$165,000
Present Worth Total	\$8,247,000	\$9,077,000
Annualized Cost – 30 years at 5%	\$537,000	\$591,000
Annual Cost Per Parcel – 224 parcels	\$2,400	\$2,640

The average annual cost per parcel is between \$2,400 and \$2,640. The average O&M cost for new users is a gross (area-wide) average, and not reflective of costs on a specific parcel because individual sewer betterments and O&M bills are based on water usage, which will vary between parcels and land uses.

This is similar to the Middle Fort Pond Brook system because the capital cost per parcel is comparable, and the O&M costs are based on an amendment to the existing O&M contract under identical terms.

Schools Solutions

The town's taxpayers pay for the Douglas and Gates schools' financial contribution to the recommended project. Table 3-5 compares the cost of sewerage to the cost of building and operating a WWTF specifically for the schools.

Table 3-5: Estimated Annual Costs for Schools

Description	Sewer	WWTF
Present Worth of Capital Costs	\$850,000	\$850,000
Annual O&M & Equipment	\$26,200	\$37,000
Present Worth O&M	\$403,000	\$571,000
Total Present Worth	\$1,253,000	\$1,421,000
Annual Cost – 30 years at 5%	\$81,510	\$92,440

Table 3-5 shows that connection to the sewer has less present worth and less annualized cost due to less costly O&M and equipment replacement costs.



3.2.1.3 Financing Hurdles

As the Town moves forward, it faces two hurdles in constructing additional sewer infrastructure. The first is identifying a revenue source that could be used as a cash flow device to finance the project prior to betterments being issued to the expansion area.

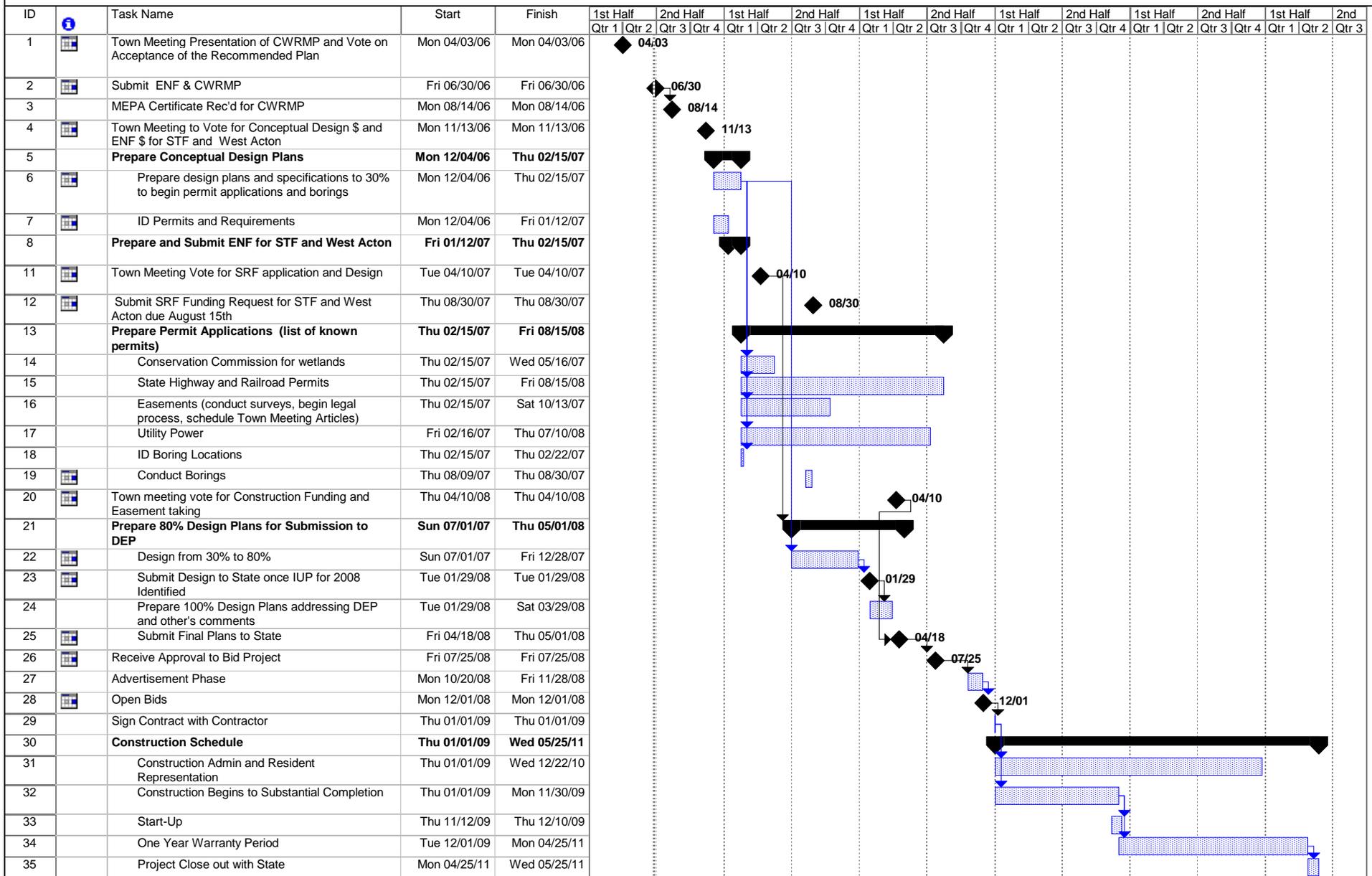
The second hurdle is an anomaly within the State betterment legislation. This legislation allows Towns to assess betterments by frontage, area, or use. In charging by frontage or area the legislation allows for betterments to be redistributed when a system is expanded (in that way the new users pay for fixed costs such as the treatment system construction). Unfortunately, the use method is not provided that provision. In order to address this, the Town has submitted legislation that will allow all three methods of assessment the same mechanism to redistribute betterments.

3.2.1.4 Schedule of Sewer Extension Design and Construction

The Town should submit an application to the State Revolving Fund for financing of the Spencer/Tuttle/Flint and West Acton Center-A sewer extension construction with a low interest loan from the Water Pollution Abatement Trust. Preliminary design funds could be appropriated in fall 2006 to proceed with the final design scope and permitting through MEPA and local regulations. Permitting and MEPA review of the process would provide an opportunity for additional public input to the process. To move in sequence with the availability of the construction loan Town Meeting should vote by spring 2007, or in a special Town Meeting, to appropriate funds for an SRF application in August 2007 for a construction loan.

Figure 3-3 provides a detailed process flow and potential schedule for the proposed extensions assuming a straightforward process. In accordance with the April 2006 Town Meeting vote, Town Meeting will vote on funding appropriations for each step of the process.

Figure 3-3: Potential Sewer Extension Schedule



Project: Fig 3-3 Potential Sewer Exten Date: Fri 06/23/06	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	



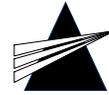
3.2.2 Sewer Assessment Bylaw

The Town's Sewer Assessment Bylaw is reproduced here:

D10. Sewer Assessment Bylaw

1. **Allocation of Cost of Sewer System.** *The entire cost of laying out, constructing and operating a system for the collection, treatment and disposal of sewage for all or any part of the Town shall be borne by the land benefited by such system, in accordance with the following provisions , except that costs incurred in connection with the planning and construction of the sewer collection and treatment facility for Middle Fort Pond Brook Sewer District, for archeological studies, paving of roads, engineering peer reviews, police details, traffic studies, and land acquisition, amounting in total to \$1,336,600, shall be allocated to taxpayers at large; and except for such costs as the Town Meeting, by a two-thirds vote, at a town meeting subsequent to this November 15, 1999 Special Town Meeting, shall allocate to taxpayers at large.*
2. **Assessment by Uniform Unit Method.**
 - a. *The Town, acting through its Sewer Commissioners, shall assess the owners of all land abutting any way in which there is a public sewer line constructed by the Town, by the uniform unit method, as authorized by G.L. c. 83 §15.*
 - b. *The Sewer Commissioners shall establish sewer assessment units, as follows:*
 - (i) *The owner of land used for a single family residence shall be assessed on the basis of one sewer unit. The owner of undeveloped land zoned for single family residential use shall be assessed on the basis of the maximum number of single family residences which may be constructed on such land as of right under the zoning requirements then in effect, without approval of the further subdivision of such land under the Subdivision Control Law.*
 - (ii) *The owner of land used for multi-family residential use, shall be assessed on the basis of .67 times the number of dwelling units presently existing on such land, provided each unit has fewer than three bedrooms as defined by Title V. Vacant land zoned for multi-family use shall be assessed on the basis of .67 times the maximum number of units which can be constructed as of right under the zoning then in effect, without approval of further subdivision of such land under the Subdivision Control Law. Multi-family units with three or more bedrooms shall be assessed on the basis of one sewer unit per dwelling unit. Each owner of a condominium or cooperative dwelling unit in a multi-family residential building shall be assessed only for his or her dwelling unit.*
 - (iii) *The owner of land used or zoned for business use, including land in the Village, Office, Business districts, except land in such districts actually used for residential or other purposes, shall be assessed on the basis of a number of sewer units calculated by multiplying the maximum floor area ratio (FAR) permitted as of right under the zoning requirements then in effect times the lot area and dividing the result by 4000, in accordance with the following formula.*

$$\text{Number of Sewer Units} = \frac{\text{Maximum FAR} \times \text{Lot Area}}{4000}$$



(iv) *The owner of land used or zoned for industrial use shall be assessed on the basis of a number of sewer units to be determined by the Sewer Commissioners, taking into account the expected daily sewage flow from such land based on Title V design flows.*

(iv) *The owner of land used or zoned for other purposes not specified in the foregoing sections, including , but not limited to, institutional and non-profit uses, shall be assessed on the basis of a number of sewer units to be determined by the Sewer Commissioners, taking into account the expected daily sewage flow from such land based on Title V design flows.*

3. **User Fees for Land Not Subject to Assessment.** *The Sewer Commissioners shall establish just and reasonable fees for the use of the public sewer system by the owner of any land, including public land, not liable to assessment, which fee shall be based on the avoided cost of construction of sewage disposal facilities to serve such land.*
4. **Assessment Rates.** *The Sewer Commissioners shall establish the assessment rate for land within the Middle Fort Pond Brook sewer area, based on total construction costs for the sewerage system serving such area, including all costs of land acquisition, engineering and design, financing and construction, divided by the total number of existing and potential sewer units within such area. In establishing such rate, the Sewer Commissioners shall apportion the total construction costs between costs required to serve the Middle Fort Pond Brook area and costs required to serve future areas within the Town and shall assess owners within the Middle Fort Pond Brook area only such costs as are reasonably necessary to serve such area, after deducting any construction costs to be recovered pursuant to Section 3 from users of the system not subject to assessment.*
5. **Sewer Privilege Fees.** *The Sewer Commissioners may establish reasonable fees pursuant to G.L. c. 83, § 17 to cover costs of construction of common sewers and other facilities required to serve land not previously served by the sewer system and not previously assessed to the owner of such land. Any such fee shall be reduced to the extent the landowner pays such expenses, in accordance with G.L. c. 83, § 22.*
6. **Annual User Fees.** *The Sewer Commissioners may from time to time establish just and equitable annual user charges to cover the cost of maintenance, repairs and operation of the sewer system.*
7. **Rules and Regulations Concerning Sewer Assessments.** *The Sewer Commissioners may adopt such reasonable rules and regulations with respect to the calculation of sewer assessments or fees as may be necessary or appropriate to implement the provisions of this bylaw.*
8. **Applicability of General Laws.** *Except as provided herein or in any special legislation applicable to the Town, the provisions of the General Laws relative to the assessment, apportionment, division, re-assessment, abatement and collection of sewer assessments and to liens therefore and interest thereon shall apply to assessments made hereunder.*
9. **Rules and Regulations Concerning Use of Sewer System.** *The Sewer Commissioners may establish rules and regulations concerning the use of the public sewer system, including but not limited to, rules and regulations prohibiting the deposit of any harmful or deleterious substance into the system, for regulating connections to the system and establishing civil penalties for violation of such rules.*



3.2.3 Wastewater Management Districts

With the Septage Management Enterprise Fund, the Town has a dedicated funding source that has the ability to evolve along with any management plan that is chosen. Since its inception it has changed to account for the Stream Monitoring Program, the Monitoring Well Program, Title 5 and Innovative/Alternative systems management program. The Septic program is analyzed on a periodic basis and fees for services, as well as all support costs, are adjusted based on the services required. Appendix I contains calculation sheets supporting the fees associated with program administration and implementation.

An additional example of the Enterprise Fund's flexibility will be shown in 2006 when Acton will commit its first betterments to onsite wastewater system reconstruction. The Town will access State Revolving Funds with 20-year repayment schedules and loan funds to homeowners with 5-10 year repayment schedules. This will allow the Town to use the funds several times over the course of the 20-year payback schedule.

As the Town makes the decisions on the menu of recommendations of the Comprehensive Water Resources Management Plan it will be well served by the unique flexibility of the Septage Management Enterprise Fund. As has been done in the past, costs for every aspect of any management plan will be identified and charged to beneficiaries of the service. This would allow the Town to, in the most extreme, hire a consultant to inspect Innovative/Alternative systems and charge the homeowner for that service or to allow the homeowner to hire the consultant and pay a minimal fee that would cover oversight costs by the Town.

Costs associated with the Wastewater Management District include development, startup, and life-cycle costs. Although the program should be designed to run in perpetuity, we have set the timeline to the 20-year planning period.

3.2.3.1 WWMD Costs

We have developed conceptual level costs assuming the Town institutes a Level 4 WWMD, which is uncertain until the final evaluation of program options is complete. The costs, including startup and operation & maintenance (O&M), would include:

- Staff to manage the data and operation of the district(s)
- Capital equipment necessary for district operations
- Data maintenance
- Development of the final program
- Legal fees for the creation of the districts
- Software development
- Subcontractor services (system pumping, inspection, O&M, etc.)
- Miscellaneous supplies

Table 3-6 presents budgetary estimates of one scenario for WWMDs program costs. The evaluation assumes an interest rate of 5%.



Table 3-6: Summary of Level 4 WWMD Estimated Setup and Operational Costs

Expenditure	Time Frame	Cost	Present Worth
Legal Support	Year 1	\$30,000	\$30,000
Legal Support	30 years	\$2,000/year	\$31,000
Software Purchase	Year 1	\$20,000	\$20,000
Software Support/Upgrade	30 years	\$1,000/year	\$15,500
Annual Supplies	30 years	\$5,000/year	\$77,000
Office Staff	30 years	\$55,000/year*	\$845,000
Management / Field Staff	30 years	\$100,000/year*	\$1,538,000
Startup Capital Equipment	Year 1	\$50,000	\$50,000
Equipment Maintenance	30 years	\$7,500/year	\$115,300
Subcontractor Services	30 years	\$700,000/year	\$10,761,000
		TOTAL	\$13,482,800

*Personnel costs reflect total costs, including benefits

A large measure of uncertainty in cost estimating exists at this point in the analysis; the development and implementation of the WWMD program will require a feasibility study. Therefore, the Engineers opinion of conceptual-level costs to implement Level 4 Wastewater Management Districts and sustain the districts for 30 years could range from \$12.0 million to \$13.5 million in present worth dollars.

In 1998 the Town drafted a Wastewater Management Plan (Appendix I) that envisioned these issues and sought to bring resolution to them. This current plan is using the previous draft plan as a springboard to a fully integrated, sustainable, wastewater management system in Acton.

The town does not envision a betterment program similar to the Sewer Assessment Bylaw to sustain the WWMDs. Instead, a yearly fee to cover the expenses of the program would be instituted. The fee, assuming 5% interest rate comparable to the sewerage present worth analysis, amounts to approximately \$340 per year per parcel for an \$12 million program to \$380 per year per parcel for a \$13.5 million program (assuming 2,300 parcels).

Currently, the Town requires pumping of septic systems every two years at an approximate cost per pumping event of \$200. Additional costs, such as more frequent pumping, inspections for real estate transactions, special inspections, and testing are variable and not included. The WWMD's yearly fee, however, includes increased monitoring, pumping, inspections, and operations and maintenance.

3.2.3.2 WWMD Schedule

The schedule for implementing Wastewater Management Districts can move independently from the sewer extension schedule. The Town should conduct a detailed feasibility study prior to embarking on



creation of a final plan. The feasibility study can start as soon as Town Meeting appropriates funds, or as soon as funding (grant) opportunities are available. The town has submitted requests for the development of similar programs to several funding programs (s.319, 604b, CZM) without success. Therefore, the town should appropriate funds in fall 2006 to develop the framework of Wastewater Management Districts in Acton. The process should be complete within one year of the appropriation with active citizen involvement.

3.3 SUMMARY OF THE RECOMMENDED PLAN

3.3.1 Long-Term Recommendations

Figure 3-4 presents the visual guide to the final recommendations. It includes West Acton Center-A in the recommendations for sewer extension with West Acton-B included under a Wastewater Management District. Final capacity availability and wastewater flows will be determined as part of a preliminary design phase and ENF process associated with the recommended solution. Table 3-7 contains the primary recommendations and provides the menu of other viable alternatives available to each Area.

Sewer Extensions

- Powdermill Plaza / High Street (Area 7) – The CWRMP concurs with the Town’s decision to move forward with sewer construction
- Spencer/Tuttle/Flint (Area 10)
- West Acton Center-A (Area 12)

Cluster (Public/Private)Systems

Areas recommended for cluster system solutions could also be included in Wastewater Management Districts if cluster systems are not implementable or wastewater management could be implemented in conjunction with cluster systems.

- Marshall Crossing / Robbins Brook (Area 1)
- Nagog Woods/ Acorn Park / North Acton Woods (Area 2)
- East Acton Village (Area 3)
- Brookside Circle (Area 6)
- Nash and Downey Roads / Dover Heights (Area 11)

Wastewater Management Districts

- Robbins Park (Area 4)
- Brucewood Estates (Area 5)
- Maynard Border (Area 8)
- Heath Hen Meadow (Area 9)
- West Acton Center-B (Area 12)
- Indian Village (Area 13)
- Flagg Hill (Area 14)
- Acton Center (Area 15)

Recommended Solutions For Needs Planning Areas

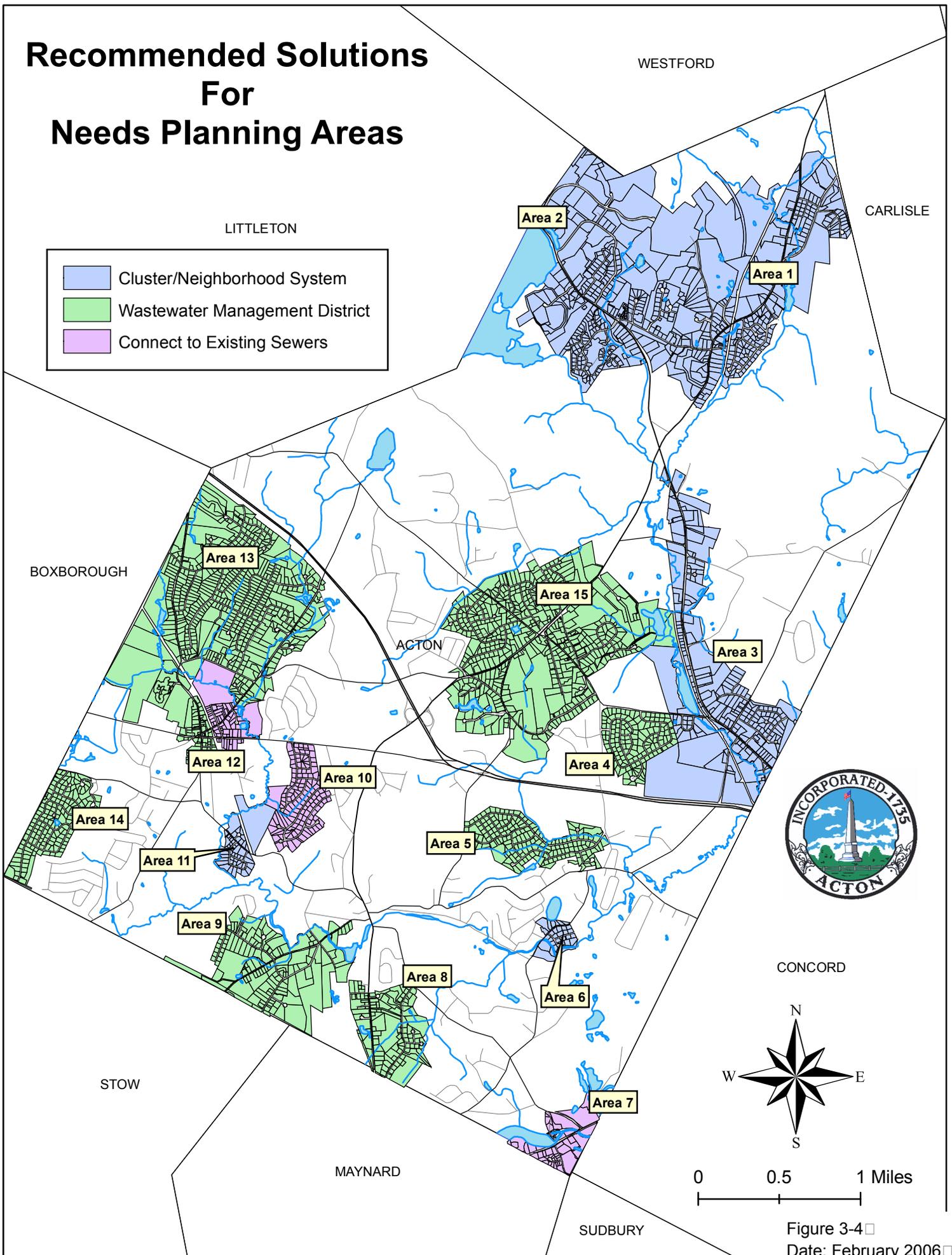


Figure 3-4 □
Date: February 2006 □
Drawn by: BLR



Table 3-7: Recommended Solutions Matrix

Rank (1-4) with 1 being the recommended choice (NA = Not Applicable)						
Needs Area #	Description	Current Priority Status	Connect to Existing Sewers	Construct New WWTF/Sewers	Cluster System	Wastewater Management District
1	North Acton Village Marshall Crossing Robbins Brook	Medium	NA	3	1	2
2	Nagog Woods Acorn Park North Acton Condos	Low	NA	2	1	NA
3	East Acton Village Route 2A	High	NA	2	1	3
4	Concord Road Robbins Park	Low	NA	2	3	1
5	Brucewood Estates	Medium	3	NA	2	1
6	Brookside Circle	Low	3	NA	1	2
7	Powdermill Plaza	High	1	NA	NA	NA
8	Maynard Border	Medium	2 Maynard or Acton	NA	3	1
9	Heath Hen Meadow / Stow Street	Low	3	NA	2	1
10	Spencer / Tuttle / Flint	High	1	NA	NA	2
11	Nash / Downey Dover Heights	Medium	NA	NA	1	2
12	West Acton Center – A	High	1	NA	2	3
12	West Acton Center – B	High	2	NA	3	1
13	Indian Village	High	NA	3	2	1
14	Flagg Hill	Medium	NA	NA	2	1
15	Acton Center	Low	NA	2 - East Acton	3	1



Other Long-Term Recommendations

- Continue the surface and groundwater sampling program to integrate the programs with Wastewater Management Districts and monitor watershed health.
- Continue to monitor the advances and regulations regarding reclaimed water use in Massachusetts.
- Continue a proactive public outreach and participation program and coordinate efforts with the NPDES Phase II Stormwater Management Program and Acton Water District initiatives.

3.3.2 Short-Term Recommendations

- Develop a feasibility study for developing Wastewater Management Districts.
- Conduct a small scale pilot study of technologies for reclaimed water use once regulations provide guidance to treatment and discharge requirements.
- Appropriate funds in fall 2006 for final study and conceptual design of the Spencer / Tuttle / Flint and West Acton Center-A sewer extension, including public outreach and MEPA submittal.
- Appropriate funds in spring 2007 for design of Spencer / Tuttle/ Flint and West Acton Center-A solutions, and to submit a State Revolving Fund application for a construction loan.
- Submit an application for State Revolving Funds for construction of the Spencer / Tuttle / Flint and West Acton Center-A sewer extension in August 2007.
- Appropriate funds in spring 2008 for construction of the Spencer / Tuttle / Flint and West Acton Center-A sewer extension scope as determined through the conceptual and final design phases.
- Pursue legislative changes to the betterment rules to allow redistribution of betterment assessments for funding of the sewer projects.

3.4 ENVIRONMENTAL IMPACTS OF THE RECOMMENDED PLAN

The Recommended Plan is comprised of non-structural, private, and public structural solutions that will benefit the overall environmental health of Acton's water resources and reduce risks to public health. The recommended structural solution, extending sewers to High Street (Powdermill Plaza), and the Spencer/Tuttle/Flint area and West Acton Center-A, will have some temporary construction impacts from noise, dust, and traffic due to general excavation activities. However, new NPDES Phase II requirements to regulate construction site runoff are directed at mitigating short-term and long-term impacts of construction.

The recommended plan takes measures to minimize the environmental impact of construction activity through design, such as minimizing cross-country excavations and locating pump stations and other infrastructure away from resource areas, and during construction, such as requiring erosion control measures to control runoff impacts.

The recommended plan does not require additional disposal area or treatment facility construction. The Adams Street WWTF does not need alterations or expansion to accept and adequately treat and dispose of the wastewater. The sewer extension recommended for Spencer/Tuttle/Flint and West Acton Center-A would increase existing WWTF by over 10%, which triggers a MEPA threshold for an ENF submittal.



The ENF submittal will provide thorough analysis and discussion of the environmental impacts of the final recommendations for these areas.

Recommendations for use of cluster systems focus on use of the existing private facilities that are underutilized or require upgrade in the near future. Using these facilities would result in better treatment of wastewater in the immediate area of these facilities.

Implementation of greater levels of onsite wastewater management through Wastewater Management Districts is an environmental benefit. Acton has a unique opportunity to evaluate the effectiveness of wastewater management districts, and the overall Recommended Plan, in protecting valuable water resources using the Health Department's surface water quality surveillance program of 50 sites across the community's surface water network.



4. REFERENCES

1. Monitoring Wells Annual Report: 2000 - 2001. Sharon Walker Mastenbrook, R.S. Acton Board of Health.
2. Middlesex County Massachusetts – Interim Soil Survey Report, Fourth Edition. NRCS Middlesex Conservation District. July 1995.
3. Soil Potential Ratings for Septic Absorption Fields – Middlesex and Essex Counties, Massachusetts. SES (NRCS) Middlesex Conservation District. March 1985.
4. Town of Acton Zoning Bylaws. Amended through January 2001.
5. Town of Acton Board of Health Rules and Regulations. As adopted September 10, 2001.
6. 1998 Master Plan Update. Acton Planning Board. December 1998.
7. Estimated Availability of Water from Stratified-Drift Aquifers in the Concord River Basin, Massachusetts. U.S. Geological Survey Water-Resources Investigation Report 94-4256. 1995.
8. SuAsCo Watershed, Assabet River Total Maximum Daily Load (TMDL) Study, Phase One: Assessment; Massachusetts Department of Environmental Protection, Army Corp of Engineers and ENSR International; November 2001; Project Number 9000-259-100.
9. Town of Acton Wastewater Management Plan. Town of Acton Board of Health, 1998
10. SuAsCo River Basin Water Supply Protection Plan. MAPC. June 1995
11. Interim Guidelines on Reclaimed Water (Revised). Commonwealth of Massachusetts EOE/DEP. January 2000
12. Simulation of Ground-Water Flow and Evaluation of Water-Management Alternatives in the Assabet River Basin, Eastern Massachusetts. DeSimone, Leslie and Massachusetts Department of Conservation and Recreation, U.S. Department of the Interior, U.S. Geological Survey. 2004.
13. Acton Water Supply District Water System Master Plan Update. Dufresne-Henry. February 2002.
14. Aquifer Protection Zones. Acton, MA. Goldberg-Zoino & Associates, Inc. February 1989.
15. Water Assets Study. Funded by EOE/DEP. Earth Tech. June 2004
16. Using Small-Scale Microwatersheds as a Water Quality Management Tool. *Watershed & Wet Weather Technical Bulletin*, Reagor/Rafferty. 2005.
17. Middle Fort Pond Sewer Project Design Basis Report. Woodard & Curran. 1998
18. Town of Acton Nonpoint Source Control Program. Woodard & Curran. 2005
19. Reports and Studies included in Attached Appendices