

Open Space: The Final Frontier

A Study for the
Open Space and Recreation Plan for the
Town of Lynnfield, Massachusetts

Field Project Final Report
Department of Urban and Environmental Policy
Tufts University

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March 22, 1999

Dr. Ann Rappaport
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RE: LYNNFIELD OPEN SPACE AND RECREATION PLAN

Dear Dr. Rappoport:

Your Tufts University team, from the Department of Urban and Environmental Policy, was highly instrumental in assisting us in the preparation of our Open Space and Recreation Plan.

This Plan, which is enclosed for your files, has now been given final approval by the Division of Conservation Services.

My most sincere thanks to you for your support of this project and to the Tufts team, comprised of Lisa Press, Laurie Archambault, April Bowling, Tracey Miller and Kris Bronars for their diligence and expertise.

Yours very truly,

Peter V. Caleshu, Chairman
Lynnfield Open Space and Recreation Plan

cc: Laurie Archambault, April Bowling, Kris Bronars, Tracey Miller, Lisa Press

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Section I Purpose and Acknowledgements



This report is the culmination of the semester-long Town of Lynnfield Open Space and Recreation Plan Field Project. The Field Project was conducted by Laurie Archambeault, April Bowling, Kris Bronars, Tracey Miller and Lisa Press, graduate students in the Department of Urban and Environmental Policy at Tufts University. The purpose of this project was to assist with the development of Lynnfield's state-required plan by providing technical assistance with inventories, mapping and wetland conservation approaches. In addition, the report makes general recommendations regarding several existing and potential environmental problems in Lynnfield. The summary of contents is stated more explicitly in the Executive Summary.

We would like to acknowledge those who aided in the development of this report, specifically Betty Adelson (Conservation Commission Administrator), for her invaluable information and administrative help; Beth Brazil (Environmental Inventory Sub-Committee Chair), Peter Caleshu (Open Space Committee Chair), Carol Cashman (Town Clerk), Barbara Drozek (Lynnfield Historical Commission and Community Setting Sub-Committee Chair), Alan Dresios (Planning Board Chair), Joe Maney (Town Administrator), Robin Nolan (Tax Assessor Administrator) and Margie Silvern (Conservation Commission Chair), for their roles in assembling the information contained in this report; Peter Phippen and Bob Hartzel, of the Massachusetts Department of Environmental Management, for providing essential information on water resources and environmental problems; Chris Russell and Tom O'Leary, of the Essex County Planners Office, who provided technical assistance with creating the computerized GIS (Geographic Information

System) maps; Gina Snyder (Environmental Protection Agency Hydrologist), for providing information on water resources; Dimitri Hoffmeyer, for technical assistance in creating the survey spreadsheet; Andrea Arnold (Massachusetts Natural Heritage and Endangered Species Program), for providing information on wildlife and vegetation; Kenneth Burnham (Lynnfield Water District Superintendent), for providing information on water district protection and town wells; and Cindy DelPappa (Saugus River Watershed Council), for information on wetlands. Finally, we would like to thank Ann Rappaport and Christine Cousineau for their roles as advisors, readers and moral supporters, as well as our fellow classmates for their insights and support throughout the development of this report.

Section II

Executive Summary

The report begins with a synopsis of the open space and recreation planning process. The body of the report is organized by the subject areas required by the Massachusetts Open Space and Recreation Plan: Community Setting including Regional Context, Community History and Population Characteristics; Environmental Inventories including Geology, Soils and Topography, Landscape Characteristics, Water Resources, Vegetation, Wildlife, Scenic Resources and Unique Environments and Environmental Problems; and Conservation and Recreation Lands Inventory. A summary of zoning and bylaws, an analysis of existing and recommended protection measures for Reedy Meadow and general recommendations for the town conclude the report.

Open Space and Recreation Planning Process

An Open Space and Recreation Plan compiles and documents the planning, conservation and recreation goals of a community, and provides a mechanism for proactive decision-making regarding land use. It is a prerequisite for many state funds and grants including Self-Help Grants, Environmental Education Grants, and Dredging and Flood Control Improvement Assistance.

Community Setting

Lynnfield, Massachusetts is located in the western part of Essex County in the northeastern part of the state. The area was originally settled in 1634, and was considered part of the City of Lynn until it was incorporated in 1814.

Lynnfield remained a rural, agricultural community until after World War II when the town experienced significant growth and evolved into a suburban, residential

community. Housing development in the 1950s and 1960s attracted new residents to the area which more than doubled the population of Lynnfield.

There are approximately 11,800 residents in Lynnfield. They comprise primarily upper-income families living in single-family, owner-occupied homes. There is little business or industry, and most residents commute to work. A long history of community involvement and careful planning has helped to preserve the residential nature of the community.

Optional Maps 1 and 2 in this section depict the location of various cultural and historical sites in the Town of Lynnfield.

Geology, Soils and Topography

Lynnfield's terrain is primarily level with elevations ranging from 64 to 216 feet above sea level. Wetlands are predominant in low lying areas.

The inventory of Lynnfield's soil types, according to varying degrees of severity of development limitations, indicates that Lynnfield's soils are primarily Class VI or VII and are considered by the Natural Resources Conservation Service to be unsuitable for septic tank absorption fields. This is particularly relevant because all of Lynnfield currently relies upon septic tanks for sewage disposal. This section of the report includes maps of Lynnfield's geology and topography (Map 2A), development limited soils (Map 2B) and scenic, cultural and historical resources (Map 2C).

Landscape Characteristics

The landscape of Lynnfield is characterized by natural landmarks such as Reedy Meadow, Pine Hill, Suntaug Lake, Pillings Pond and the areas surrounding Beaverdam Brook. These existing open spaces enhance Lynnfield's natural environment and provide residents with outdoor recreation opportunities.

Water Resources

Lynnfield has three large wetlands, two major rivers, several streams and ponds, a lake and two major aquifers that constitute the Town's groundwater supply. Both Lynnfield and Lynn derive their water supply from these water bodies. The Water Resources section provides a comprehensive inventory of Lynnfield's water resources, and maps of the Water Resources (Map 3A), Drainage Sub-Basins (Map 3B), Flood Map (Map 3C) and Water Protection District (Map 3D).

Vegetation and Wildlife

Lynnfield is located within the forest zone of Transition Hardwoods, which is also referred to as an Oak-Conifer forest. Vernal pools and a freshwater marsh (Reedy Meadow) contain a wide variety of plant, shrub and tree species. Reedy Meadow, also known as the Lynnfield Marsh, and its adjacent fields serve as a habitat for a number of common wildlife species such as deer, fox, raccoon, frogs and turtles. There are no identified significant wildlife corridors in Lynnfield.

The Vegetation and Wildlife inventories reveal that there are no federally listed Rare, Threatened or Endangered Species known to inhabit Lynnfield. However, a number of plant and animal species designated as species of Special Concern, Threatened or Endangered in Massachusetts by the Massachusetts Natural Heritage Program have been sighted in Lynnfield. The majority of these species inhabit Reedy Meadow. Reedy Meadow, considered one of the largest freshwater Typha (or cattail) marshes in Massachusetts, is a unique and vital habitat that serves as nesting ground for migrating bird species and is conducive to the presence of a variety of vegetation. A map depicting Lynnfield's rare wildlife habitat (Optional Map 3) is included in this section.

Scenic Resources and Unique Environments

The only state-registered Scenic Resource in Lynnfield is Reedy Meadow. Reedy Meadow is a 540-acre freshwater marsh, of which approximately 405 acres lie within Lynnfield. It was designated by the United States Department of the Interior as a National Natural Landmark in 1972. The Scenic Resources and Unique Environments section describes the site.

Environmental Problems

Environmental problems that require attention by the Town of Lynnfield range from leaking underground storage tanks to water supply and quality. A number of these problems are interrelated and have a synergistic impact on the environmental quality in Lynnfield.

Lynnfield passed a town bylaw in 1976 with requirements that exceed current state standards regarding underground storage tanks. Potential contamination of soil, groundwater and wetlands remains a threat in the municipality, however, due to underground storage tanks that pre-date the bylaw. The Lynnfield fire department estimates that there are 100 to 200 underground residential storage tanks that are candidates for leaking pollutants into the environment.

Overflowing septage from failed septic systems is an additional source of environmental contamination. Increased biological oxygen demand (BOD) and the presence of fecal coliform bacteria in Reedy Meadow's surface water are indications of leakage from septic systems. Incremental filling, as well as cultural eutrophication resulting from the introduction of nitrates from overflowing septic systems, has decreased Reedy Meadow's ability to absorb flood waters. Simultaneously, Reedy Meadow is under threat from encroaching land development and pollution from pesticides and fertilizer runoff from nearby golf courses, the New England Power Company, and the Boston and Maine Railroad. This land development around the

Meadow has increased the amount of impervious surfaces, thus decreasing water infiltration into the soil and increasing surface water runoff. The increased quantity of surface water and decreased flood storage capacity of the Meadow have raised the water table, which has exacerbated flooding, flood-related damage and septic tank failure.

Areas of concern that are particularly vulnerable to cultural eutrophication and nutrient loading from septic tanks and lawn fertilization include, but are not limited to, the areas surrounding Pillings Pond, Reedy Meadow and the upper portion of Chestnut Street. Acquisition of available open space near and surrounding wetlands and water bodies will facilitate the prevention of cultural eutrophication. Routine monitoring of water districts located down gradient of developments relying upon septic tanks is recommended to prevent the consumption of water contaminated with fecal coliform bacteria.

Conservation and Recreation Lands

The Inventory of Conservation and Recreation Lands details the lands currently used for conservation and recreation in Lynnfield, and identifies viable candidate areas for future acquisition and designation as open space. The inventory includes private lands that are currently protected by local greenbelt associations, and also identifies the protected public lands owned by the Conservation Commission and those that are designated as part of a water district. Publicly-owned open space areas such as school grounds and parks are also listed in the inventory, though it must be remembered that these areas are not protected and may be developed in the future. This section includes a map (Map 4) depicting Lynnfield's open space and recreation areas.

The inventory revealed that there is one parcel listed as forestry (Massachusetts General Law Chapter 61) and two parcels which qualify as private recreation areas (MGL Chapter 61B). There are no agricultural parcels (MGL Chapter 61A) in Lynnfield. Lynnfield's conservation areas include Beaverdam Brook, Bow Ridge, Bennett Keenan

and Pine Hill Lot. Lynnfield's recreation areas include Jordan Park, Glen Meadow Park, Freeman Park, Newhall Memorial Park, Town Common and athletic fields at the five schools.

Zoning and Bylaws Summary

Lynnfield's zoning and bylaws relating to open space planning include greenbelt zoning, a floodplain overlay district, a groundwater protection district, a wetland buffer zone district, a Conservation Commission bylaw, a Board of Health septic bylaw and a water restriction bylaw relating to water districts.

Reedy Meadow: After the ACEC Proposal

Reedy Meadow constitutes a valuable resource for the town of Lynnfield. Not only does this area provide recreation for residents, it is also a valuable environmental habitat for many of Massachusetts' threatened species, and acts as a natural flood control and water purification system.

There are a number of tools that can be employed to help residents understand the importance of Reedy Meadow. Public education is a powerful tool to enhance the public's appreciation of the Meadow and the various functions it provides for the town, and encourage the adoption of practical and environmentally sensitive land use practices. In addition, there is a need for the towns in which Reedy Meadow is located (Lynnfield and Wakefield) to collaborate on devising and implementing effective land use protection policies.

General Recommendations

General recommendations to Lynnfield include: the adoption of a wetlands bylaw to give the Conservation Commission more authority in regulating activities in and near wetlands and water bodies; collaborations with public, private and non-profit

interest groups in order to pursue land acquisition through purchase and easement; refinement and enforcement of local septic regulations; and additional protection for Suntaug Lake and Hawkes Pond against the impacts of land uses occurring on their shores and further upland within the watershed.

Section III

The Open Space And Recreation Planning Process



What Is Open Space?

Open space can mean a variety of things to different communities. In a general sense, open space is land that does not contain substantial buildings or other structures, roads or impervious surfaces. This definition, however, is not comprehensive because a park may have buildings, roads or a parking lot. The Massachusetts Recreational and Open Land Statute (MGL Chapter 61B) defines open space as follows; land that is "retained in a substantially natural, wild or open condition, or in a landscaped condition in such a manner as to allow to a significant extent the preservation of wildlife and other natural resources." This definition, however, excludes community gardens and urban parks. For communities, open space may mean a neighborhood park, a greenway or a preserved two hundred year old forest. Since all land in Massachusetts has been impacted by humans, and different communities contain land with varying degrees of human disturbance, the definition must remain broad.

Open space is defined differently for urban, suburban and rural communities. These differences are reflected in the state's Self-Help and Urban Self-Help grant programs. Lynnfield's population of approximately 11,800 qualifies the town, once its Open Space and Recreation Plan is complete, for a Self-Help grant. For a community to be eligible for an Urban Self-Help grant, the population must exceed 35,000. Urban Self-Help grants can be used to acquire land for parks, outdoor recreation purposes or the rehabilitation of land for park and outdoor recreation activities. In contrast, Self-Help grants must be used to fund the acquisition of land

for conservation purposes and to develop suitable public outdoor facilities for these properties.

Why Protect Open Space?

Most of the advantages of open space are obvious: scenic beauty, recreational opportunities, preservation of biological diversity and community character. Other benefits are less apparent: pollution prevention, aquifer protection, increased property values and fiscal impacts (open space can be a less expensive alternative to development for a municipality).

Reedy Meadow, a 540-acre cattail marsh located along the Saugus River, is an important ecological and aesthetic feature in the Lynnfield community, and an essential part of the town's unique character. Two years ago, Lynnfield applied to the Executive Office of Environmental Affairs (EOEA) to nominate Reedy Meadow for Area of Critical Environmental Concern (ACEC) designation. The Meadow was not nominated for full review because the EOEA believed there were other land management tools that the towns of Lynnfield and Wakefield had not yet employed. In fact, Lynnfield has already employed many of the land management tools recommended by the EOEA, but these land-use bylaws were not mentioned in the submitted proposal. There are additional land management strategies that could be employed to protect the Meadow from further deterioration, such as stronger buffer zone performance standards, public education and education of town officials. Recommendations from this Open Space and Recreation Plan can help Lynnfield focus on the community's priorities and use the open space planning process to begin implementing some of these additional management tools.

Open Space Planning

An Open Space and Recreation Plan compiles and documents the planning, conservation and recreation goals of a community, and requires a community to go beyond a statement of intent. The extensive information gathering necessary for the plan (maps, surveys, inventories, demographics, etc.) helps a community establish criteria for open space preservation. The process of creating the plan requires the community to think in terms of interrelated goals and priorities, and synthesize broad abstract goals and translate them into concrete strategies. The maps and other data generated for the Plan can inform a variety of decisions, and can be used as an educational tool in the community's library and schools.

The Open Space and Recreation Plan enables a community to gather a detailed inventory of the community's natural resources. The Plan requires a community to identify undeveloped parcels that, if developed, could have an impact on habitat, wetlands and the community's water supply. To have a plan in place helps a community prioritize and respond quickly when a parcel does become available.

The state-approved Open Space and Recreation Plan is a prerequisite for many state funds and grants. Although it is difficult for the state or its municipalities to afford to acquire all available open space, Massachusetts has made assisting communities in land acquisition an environmental priority. Last year, the state legislature passed a \$399 million 1996 Open Space Bond Bill. Money from this bill will fund several programs including the Self-Help and Urban Self-Help grants. The following Open Space Bond Bill programs will offer funds to communities with state-approved Open Space and Recreation Plans:

- Self-Help and Urban Self-Help
- The Commonwealth Land Conservation Trust
- Environmental Education Grant Program

- Statewide Planning
- Dredging and Flood Control Improvement Assistance
- Restoration of Degraded Significant Habitat

For many communities, the open space planning process involves revising a previous Open Space and Recreation Plan, because each plan is only viable for five years. Since many sections of the plan, such as geology, soils, landscape characteristics, wildlife and water resources do not, or should not, change in that short a time period, the revisions are not extensive. The Open Space and Recreation Plan currently underway will be the first to be submitted by Lynnfield.

The Open Space Committee

The purpose of putting together an Open Space Committee is to create a group that is responsible for the creation of the Open Space and Recreation Plan. The Committee should be representative of the community, ideally including Conservation Commission members, at least one Planning Board member, a Recreation Department member, a Historical Society member and a Board of Health member. Additionally, citizens concerned with the town's character, trail development, wildlife, environmental and natural resource protection are valuable members.

The Mapping Process

An Open Space and Recreation Plan requires at minimum the following six maps: a zoning map, a special landscape features map, a water resources map, a floodplain map, a conservation and recreation lands map, and an action plan map. Each of these maps often need to be further broken down. The zoning map may require overlays to depict groundwater protection districts. Special landscape features maps require soil types, geologic features and topography, and scenic

resources. The water resources maps require surface water, wetlands, watersheds of water supply areas, flood hazard zones, floodplains and zones of contribution to public supply wells. The open space, recreation and conservation map requires the delineation of all public, nonprofit and privately protected lands. Optional maps include maps of historic sites, population characteristics, current land uses, maximum zoning buildout, vegetation and wildlife habitat, and environmental problems.

The maps created for an Open Space and Recreation Plan must be reproducible. The state will need several copies of the Plan and the town will need to use the maps in various reports or for later updates of the Plan.

Each community must decide whether to use GIS, AutoCAD or other variations of computer-generated maps, or traditional hand-drawn maps that use the USGS map as a base. There are many benefits to using computer-generated maps. Once data is entered into the system, the maps can be printed out at any scale. MassGIS (a state office created for statewide planning under the EOEA) maps look very professional and are easy to overlay and reproduce. However, they can be expensive, roughly \$60 a map which is more than most communities can spend for a process done to secure state funds. MassGIS has some of the data already available in their system. The Essex County Planning Office, a regional state office with a planning division, has access to the MassGIS database base maps as well as GIS maps of their own.

The Essex County Planning Office has generated the following maps for the Lynnfield Open Space and Recreation Plan: a zoning map, a groundwater protection district map, a floodplain map, demographic maps and a conservation, recreation and open space map. The Essex County Planning Office, with the assistance of our Field Project team, is updating existing, but incomplete, MassGIS maps related to Lynnfield. We have updated many of the maps: zoning,

floodplain, water supply, recreation and conservation land, and the groundwater protection zone. Essex County Planning has incorporated this new information into the MassGIS database. To supplement the maps generated by Essex County Planning, we reproduced maps from USGS and MassGIS, and hand drew maps.

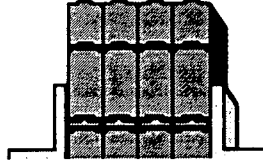
Resources

Dawson, A. and S. Zielinski. 1997. Environmental Handbook for Massachusetts Conservation Commissions. Belmont: Massachusetts Association of Conservation Commissions.

Massachusetts Executive Office of Environmental Affairs. 1995. Open Space Planners Workbook.

Pahlavan, D. 1996. MassGIS Open Space Mapping Project.

Section IV-A Inventory Introduction



Several inventories are required by Massachusetts for inclusion in an Open Space and Recreation Plan. For the purposes of this project, we agreed to perform the following: Community Setting, Environmental, and Conservation and Recreation Lands. This included generating all the required maps within these sections. All maps were generated through computerized GIS, except maps 2A, 2B, and 2C which were created by hand.

Inventories are essential to allow the town to take full advantage of its resources to formulate its Open Space and Recreation Plan, including the strategy for acquiring additional parcels. The Community Setting inventory including: Regional Context, Community History and Population Characteristics, sets the stage for the Open Space and Recreation Plan by providing the information necessary to plan according to the town's particular needs. The state also requires a build-out analysis to be performed under this section. Due to time constraints, such an analysis was not performed for this report.

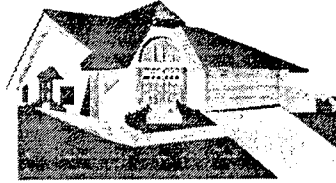
The Environmental inventory including: Geology, Soils and Topography, Landscape Characteristics, Water Resources, Vegetation, Wildlife, Scenic Resources and Unique Environments, and Environmental Problems, lists and describes the natural resources of the town, as well as their vulnerabilities and disturbances. This enables the town to target the Plan towards its most valuable and vulnerable resources, especially in terms of its conservation needs.

The final inventory, Conservation and Recreation Lands, provides a comprehensive listing of those private and public lands already protected, demonstrating to the state the extent to which Lynnfield has already sought to

protect its natural resources and provide adequate recreation lands to its citizens. It also provides information on the parcels most likely to provide protection of endangered resources and yield optimum recreational value. These parcels may then be targeted for acquisition by the town.

The inventories sections that follow detail descriptions of the data we collected, as well as methodologies, resources and contacts. A glossary is provided at the end of this report to provide definitions of technical language. The sections include the state required maps entitled Zoning (Map 1), Geology and Topography (Map 2A), Development Limited Soils (Map 2B) and Scenic, Historical and Cultural Sites (Map 2C), Water Resources (Map 3A), Drainage Sub-Basins (Map 3B), Flood Map (Map 3C), Water Protection District (Map 3D), and Open Space and Recreation Areas (Map 4). Also included are optional maps of Historical Buildings (Optional Map 1), Historical Sites (Optional Map 2), and Habitats of Rare Wildlife (Optional Map 3).

Section IV-B Community Setting



Regional Context

The Town of Lynnfield, Massachusetts is located in the western part of Essex County in the northeastern part of the state, known as the North Shore. Lynnfield is bordered by North Reading on the north; Reading on the west; Middleton, Peabody and Lynn on the east; and Saugus and Wakefield on the south. Lynnfield's total area is 10.49 square miles. The town is 15 miles north of Boston, 19 miles east of Concord and 28 miles south of Newburyport. Lynnfield's location on the North Shore, with access to major highways, makes it easy for residents to travel to nearby mountains, beaches and major cities.

Lynnfield, which is on average 98 feet above sea level, is primarily made up of gently rolling countryside with several bodies of water. The Ipswich River flows along the northern border and the Saugus River makes up part of the southern and western borders. Lynnfield shares Suntaug Lake with Peabody, from which the latter receives part of its water supply. Pillings Pond, an artificial lake located in the center of Lynnfield, is surrounded by many year-round homes and summer cottages. Throughout its history, Pillings Pond has been central to recreational activities in town. Hawkes Pond is shared with the Town of Saugus and is part of the Lynn water supply. Reedy Meadow, a freshwater marsh, is shared with the Town of Wakefield.

Lynnfield has evolved from an agricultural community, with many farms and orchards, to a traditional New England residential community. With U.S. Route 1 and State Route 128 (Interstate 95) passing through Lynnfield, residents are

within easy commuting distance of Boston. For most of the 20th century, Lynnfield has been an upper-income suburb predominantly composed of owner-occupied homes. Lynnfield has little business or industry, thus most residents work outside of the town. Thoughtful planning and zoning in earlier years, and continued efforts to restrict large businesses and industry, have helped to maintain Lynnfield's residential character.

Lynnfield is a member of the Metropolitan Area Planning Council (MAPC). Among other responsibilities, MAPC evaluates conservation and recreation priorities in the greater metropolitan Boston area. "Its goals are to preserve and protect critical land resources, to shape the growth of the region, to help preserve and enhance a 'sense of place,' and to fulfill the recreation needs and provide access to appropriate open spaces (Town of North Reading, Massachusetts Conservation and Recreation Plan 1995)." MAPC has several subregional groups; Lynnfield is a member of the North Suburban Planning Council.

History of the Community

The first settlers came to the area known today as Lynnfield in 1634. Prior to 1634, the Saugus Indian Tribe inhabited the area for as many as three thousand years. Native American artifacts have been found at camp sites around Lynnfield, including near the Sagamore Golf Club and on Partridge Island at the edge of Reedy Meadow. The newly settled area was known as Lynn End and was a parish of the town of Lynn for many years. In 1782, Lynnfield became the Second District in Lynn and in 1814 was incorporated as a town. The town has an open Town Meeting form of government, headed by a three-member Board of Selectmen.

The Meeting House, still standing on its original green, was built in 1714 and is considered the third oldest Puritan Meeting House in New England. The Meeting House and Meeting House Common District were included on the National

Register of Historic Places on November 21, 1976. The Meeting House sits in the middle of the Meeting House Common District, which is the center of many town activities and now the home of several municipal buildings. Two other buildings in Lynnfield are listed with the National Registry: The Henfield House (1667), the oldest standing building in Lynnfield, and The Hart House (1672). There are several other historical buildings, cemeteries and churches around town (see Optional Maps 1 and 2).

The Newburyport Turnpike (later known as Route 1) was completed in 1806 and the Lynnfield Hotel (1804), destroyed by fire in 1894, was the first stagecoach stop from Boston. During the mid-1800s, the railroad began operating in Lynnfield. This access brought many more people to the area, particularly in the summer to use the water resources such as Suntaug Lake and Pillings Pond. Until the beginning of the 19th century, Lynnfield was mostly an agrarian community. During the 1800s a few industries appeared, including several mills and shoe factories. The Walnut Street mill, owned by the Gerry family, is perhaps the most famous. It was originally a grist mill in 1848, then a woolen mill. In 1872, it became the famous Gerry's Cider Mill, the largest cider mill in this part of the country, which attracted visitors from all over. The mill was destroyed by fire in 1974. Additionally, peat moss was excavated from Reedy Meadow and granite was quarried in the Kallenberg Quarry, both of which are now conservation areas.

Lynnfield remained a rural community until after World War II when the town experienced significant growth similar to many of its neighboring towns. The population more than doubled during the 1950s and 1960s spurred by the development of new housing (1,654 houses built during this 20 year span). This expansion of population resulted in increased public services such as post offices, fire and police stations, new shopping centers and an addition to the library. The once rural community was transformed into a suburb. During the 1960s, a new high

school and library were built. Moreover, during this decade conservation land was acquired and recreational facilities were built.

Lynnfield has had a long history of thoughtful land use planning and community involvement. During the late 1920s, Nelson B. Todd and Louis B. Tuck, residents of Lynnfield, recognizing the need for planning, made arrangements for the first zoning bylaws and implemented the first Planning Board. They established some of the state's first restrictions on land use to help protect the residential character of the town. During the 1950s, the Planning Board prepared "The Master Plan," which dealt with zoning, streets, schools, recreation and public areas, public buildings, utilities and services. The 1961 "Long-Range Plan for Parks and Recreation" emphasized the need for new and enhanced open space "before the town becomes saturated with homes." The Plan mentioned the importance of maintaining the three golf courses in Lynnfield. In addition, it stressed the need to create greenbelt areas and a wildlife reservation. As a result, the first Lynnfield Conservation Commission was founded in 1961 "for the promotion, development and protection of the natural and watershed resources of the town of Lynnfield."

Population Characteristics

When the town was incorporated in 1814, the population was approximately 500. Over the next one hundred years, the town experienced slow growth and by 1914 its population had only doubled. However, following World War II the population exploded. The 1950, 1964 and 1974 censuses listed 3,935, 9,600 and 11,800 residents respectively. During the decade between 1955 and 1965, the population increased by 73 percent. Nearly 50 percent of the homes in Lynnfield were built during the 1950s and 1960s. There were 11,274 residents in the Town of Lynnfield, according to the 1990 U.S. Census. The current population, according to the 1997 census performed by the Town Clerk, is approximately 11,800.

Lynnfield is 97.6 percent white, and almost equally male and female. The highest concentrations of residents in different age groups are school-aged children, middle-aged adults and senior citizens. Of the 3,916 households in 1990, 73 percent were married-couple families with an average of 2.88 persons per household. Over 91 percent of the homes are single-family and owner-occupied, and many have high values and fall into high price ranges. These statistics, and the figures below, emphasize that Lynnfield is a family-oriented town with a significant elderly population. The demand and need for open space and recreational sites is probably significant as a result.

<u>AGE</u>	<u>NUMBER OF RESIDENTS</u>
0-4	616
5-9	739
10-14	695
15-19	766
20-24	717
25-29	652
30-34	728
35-44	1,876
45-54	1,583
55-59	703
65-74	1,060
75+	553
TOTAL	11,274

(Metropolitan Area Planning Council, 1995)

Most of Lynnfield's families are middle to upper-income with a median household income above \$58,000. Most residents are skilled and professional workers who work outside of the town. The unemployment rate is below the state and national averages. Additionally, there is a strong sense of education in Lynnfield with more than 80 percent of graduating high school seniors attending four-year colleges.

Due to a history of strict zoning regulations, Lynnfield has very few businesses and little industry. There are only about 30-35 retail stores in the town. The largest employers in town are the Town of Lynnfield, UPS, Boston Acoustics, Inc., Weathervane Seafoods, Inc. and Johnson Controls, Inc.

Methodology

Information contained in the sections above was compiled from a variety of sources. After careful review of the state requirements for an Open Space and Recreation Plan found in the Open Space Planner's Workbook, the Open Space Plan for the town of North Reading was reviewed. The North Reading Plan was prepared professionally and recommended as a model Open Space and Recreation Plan. Meetings with Carol Cashman, the Town Clerk, and Barbara Drozek, of the Lynnfield Historical Commission, helped to provide anecdotal information about the town. Furthermore, both Carol and Barbara were able to provide a number of resources that were useful in researching town history and demographics. The Massachusetts Historical Commission was consulted to obtain an inventory of historical sites in Lynnfield.

Resources

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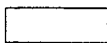
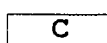
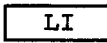

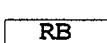
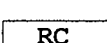
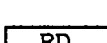

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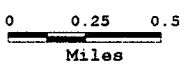
Contacts

Massachusetts Historical Commission: (617) 727-8470

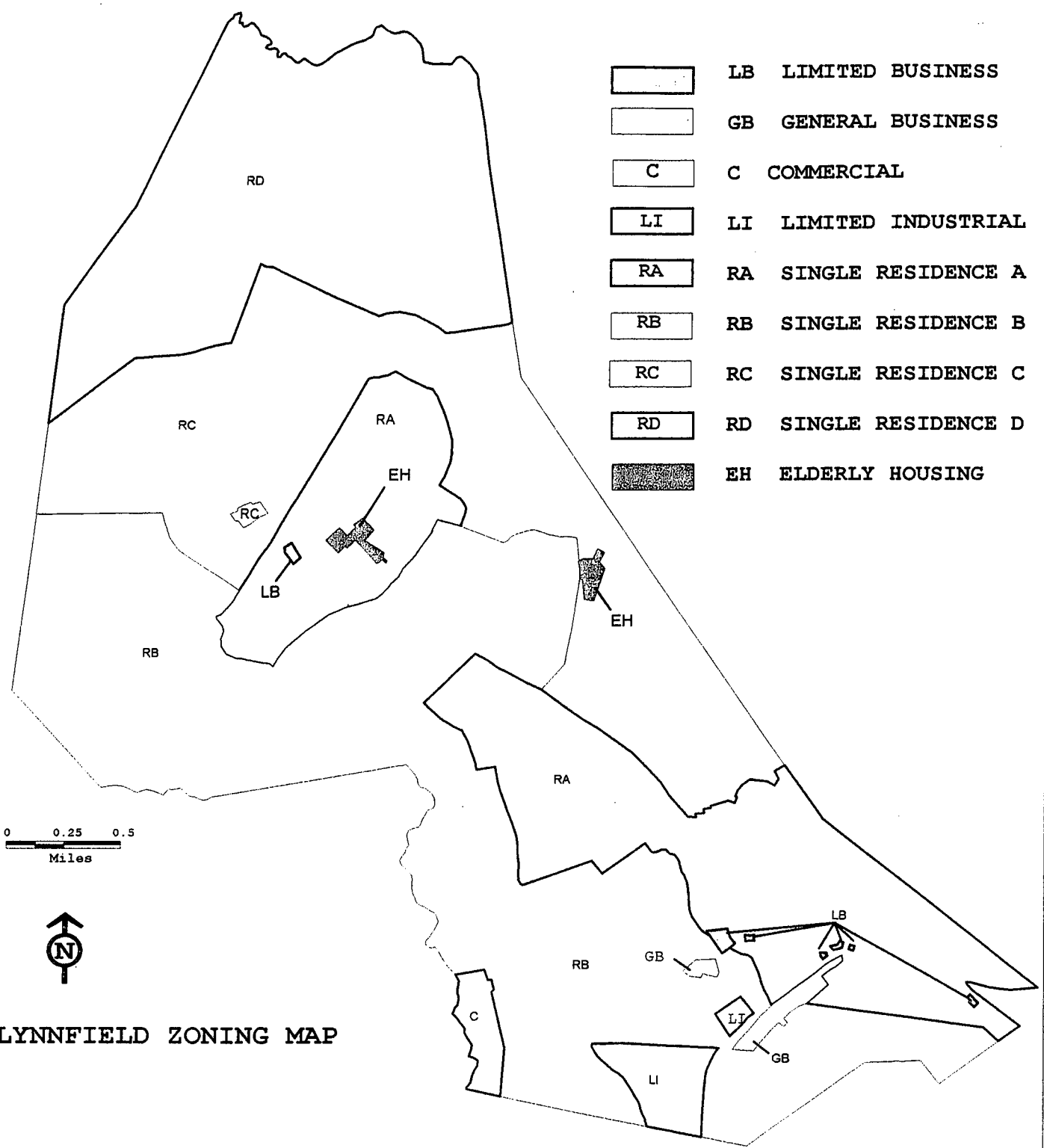
Barbara Drozek, Lynnfield Historical Commission: (617) 334-3826

Carol Cashman, Lynnfield Town Clerk: (617) 334-3128

-  LB LIMITED BUSINESS
-  GB GENERAL BUSINESS
-  C COMMERCIAL
-  LI LIMITED INDUSTRIAL
-  RA SINGLE RESIDENCE A
-  RB SINGLE RESIDENCE B
-  RC SINGLE RESIDENCE C
-  RD SINGLE RESIDENCE D
-  EH ELDERLY HOUSING

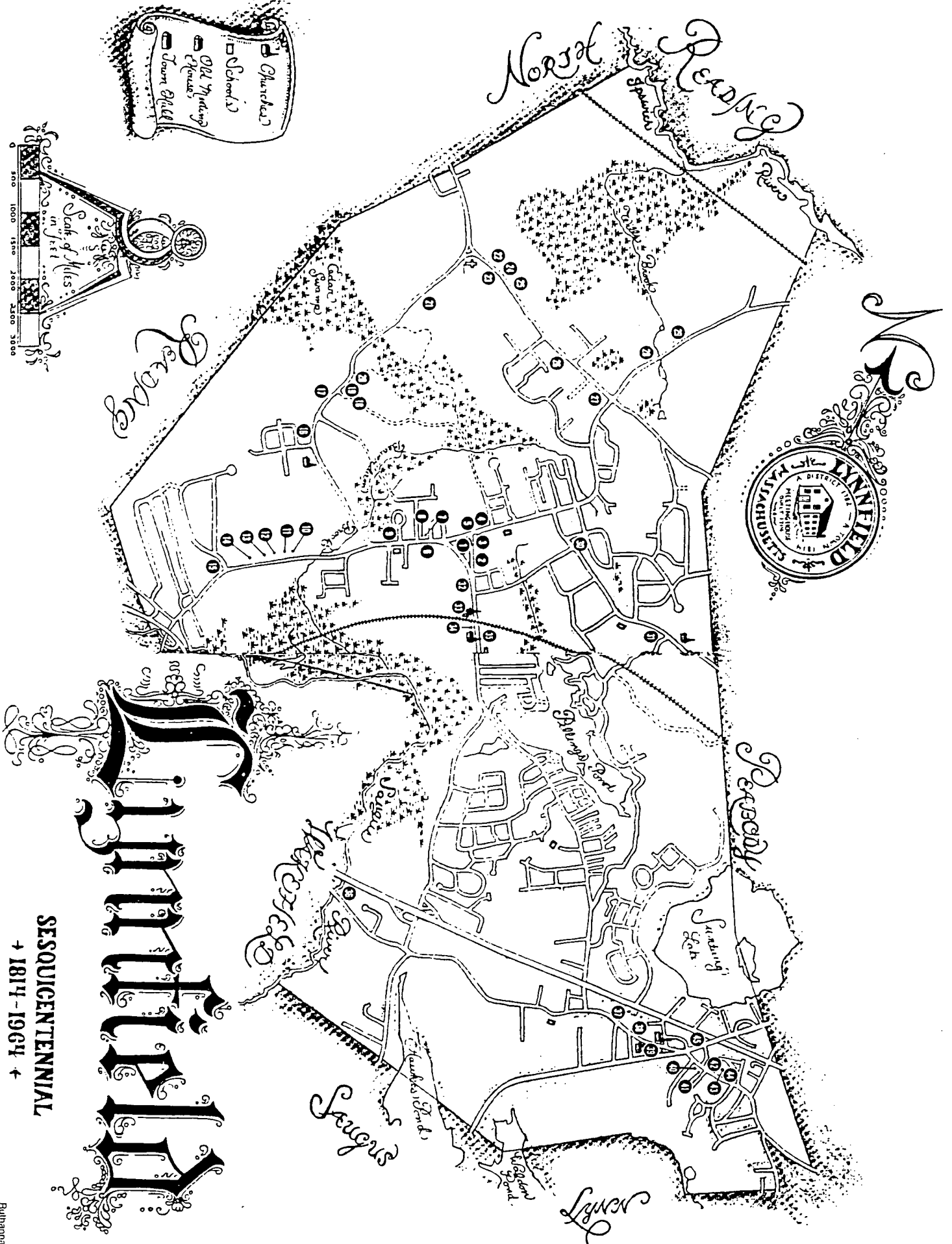


LYNNFIELD ZONING MAP



MAP SOURCE: DIGITIZED 4-97 BY THE ESSEX COUNTY OFFICE OF REGIONAL SERVICES FROM A 125% REDUCED ZONING MAP OF UNKNOWN SCALE, PROJECTION, AND ACCURACY.
MAP WAS ADJUSTED TO FIT A DIGITAL USGS 1:25000 7.5' QUADRANGLE IN LATITUDE/ LONGITUDE (DECIMAL DEGREES).

Optional Map 1: Historical Buildings in Lynnfield



SESQUICENTENNIAL
 + 1814-1964 +

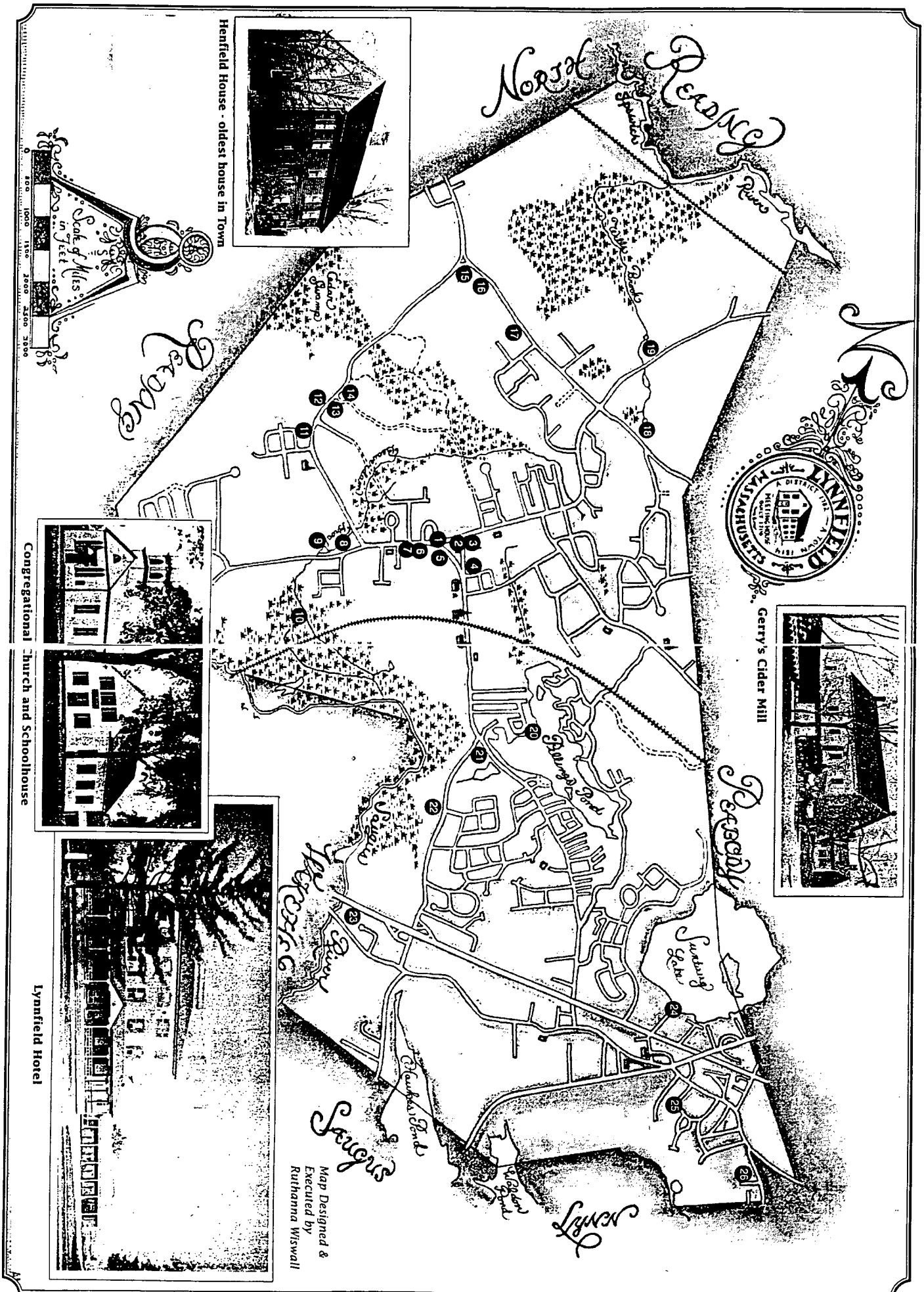
Ruthanna Wiswell

Historical Buildings in Lynnfield - Legend to Optional Map 1

1. Old Meeting House (1714) - Nationally Registered
2. Children's Room, Lynnfield Public Library (1856)
3. Chapel, Centre Congregational Church (1832)
4. John Bryant III House (1807)
636 Main Street
5. Jonathan Bryant House (Circa 1839)
618 Main Street
6. The Reverend Joseph Mottey House (Circa 1810)
567 Main Street
7. Old Parsonage (1839)
574 Main Street
8. Second George Whittredge House (1835)
556-558 Main Street
9. Whittredge House (1802)
498 Main Street
10. Joseph Henfield House (1667) - Nationally Registered
300 Main Street
11. Captain Thomas Flint House (1720)
272 Main Street
12. Richardson House (1823)
258 Main Street
13. Moses Richardson House (Before 1745)
244 Main Street
14. Samuel Skinner House (1807)
226 Main Street
15. John Orne House (1761-1765)
192 Main Street
16. Hart House (Circa 1670) - Nationally Registered
172 Chestnut Street
17. John Hiram Perkins House (Circa 1695)
276 Chestnut Street
18. Bowman Viles House (Circa 1789)
281 Chestnut Street
19. Gay-Downing House (1829)
289 Chestnut Street
20. Daniel Needham House (Before 1800)
345 Chestnut Street
21. Mrs. James Reed House (Circa 1700)
6 Cooks Farm Lane
22. Joel Hewes House (Circa 1840)
665 Lowell Street
23. Joseph Tapley House (Circa 1700)
650 Lowell Street
24. Jeremiah Sheldon House (Before 1789)

- 621 Lowell Street
25. Jesse Tapley House (Circa 1825)
593 Lowell Street
 26. Deacon Emerson House (Circa 1714)
472 Lowell Street
 27. John Bryant House (1830)
326 Lowell Street
 28. William Smith, Jr., House (1762)
1218 Main Street
 29. William Smith House (1721)
1282 Main Street
 30. James Hewes House (Circa 1846)
94 Essex Street
 31. Otis Skinner House (Circa 1840)
347 Essex Street
 32. Parsons House (Before 1801)
93 Summer Street
 33. Ben Perkins House (Before 1843)
123 Summer Street
 34. Danforth House (1774)
165 Summer Street
 35. Doctor George S. Robinson House (1802)
184 Summer Street
 36. Timothy Munroe House (1690)
40 Salem Street
 37. Mansfield-Gilman House (Before 1779)
662 Salem Street
 38. Ezra Mansfield House (1840)
698 Salem Street
 39. Joseph Hobson House (Before 1800)
755 Salem Street
 40. Aaron Newhall House (1796-1804)
829 Salem Street
 41. Hardy House (Circa 1810)
849 Salem Street
 42. Munroe-Newhall House (Early 1800's)
880 Salem Street
 43. Uriah Munroe House (Circa 1800)
886 Salem Street
 44. Deacon Daniel Mansfield House (Circa 1740)
938 Salem Street
 45. E. Horace Spinney House (Circa 1837)
494 Broadway

Optional Map 2: Historical Sites in Lynnfield



Historical Sites in Lynnfield-Legend to Optional Map 2

1. The Common
2. The Old Meeting House (1714)
3. The Chapel of the Centre Congressional Church (1832)
4. The Centre Schoolhouse (1856)
5. The Old Burying Ground
6. The Mottey House (Circa 1785)
567 Main Street
7. The West Cemetery (1813)
8. The Captain Flint House (1720)
272 Main Street
9. The Henfield House (1667)
300 Main Street
10. Partridge Island
11. The Hart House (1672)
172 Chestnut Street
12. The Perkins House (Circa 1695)
276 Chestnut Street
13. The Downing House (1829)
289 Chestnut Street
14. The Needham House (1790)
345 Chestnut Street
15. The Joseph Tapley Tomb
16. The Tapley House (Circa 1700)
650 Lowell Street
17. The Deacon Emerson House (1714)
472 Lowell Street
18. Pocahontas Spring
177 Lowell Street
19. The Smith House (1721)
1282 Main Street
20. The Serpentine Mine
21. The Townsend Plaque
22. Gerry's Cider Mill
Walnut Street
23. The Munroe House (1690)
40 Salem Street
24. Suntaug Lake
25. Kallenberg Quarry
26. South Burying Ground
Salem Street

Additional Historical Sites in Lynnfield
(listed on the Massachusetts Historical Commission Inventory,
but not included on the maps)

William Whittredge Shoe Factory - 562 Main Street

Bancroft General Store and Tearoom - 568-570 Main Street

William E. Roundy House - 580 Main Street

Burleigh-Russell House - 584-588 Main Street

Wakefield Cooperative Bank - 594 Main Street

Minot Carter House - 600 Main Street

Tate House - 12 Salem Street

Lyman Tylor House - 35 South Common Street

Lynnfield Center School House - 18 Summer Street

Daniel Townsend Marker - Summer Street

Seven Men's Boundry Marker - West Livingston Drive

Section IV-C1 Geology, Soils and Topography



Description

A basic knowledge of the surficial geology is necessary for any evaluation of an area's natural resources. Since surficial geology literally serves as a foundation for flora, fauna and human development, familiarity with this natural foundation yields additional knowledge of the ecosystem health and vulnerability.

The terrain of Lynnfield ranges from level to gently rolling, with elevations of approximately 64 to 216 feet above mean sea level. Wetlands such as Reedy Meadow cover much of Lynnfield's lowlying areas. The underlying bedrock is Ordovician Sillimanite with surficial deposits of mainly glacial till or outwash origins, with the exception of wetlands soils which formed in deposits of recent alluvium (see Map 2A).

The approximately 35 distinct soil types found in Lynnfield form five major complexes: the Paxton-Montauk-Urban association; the Merrimac-Hinckley-Urban association; the Canton-Woodbridge-Freetown association; the Chatfield Hollis-Rock outcrop association; and the Freetown-Fluvaquents association (see Map 2B). Almost all of these soils fall into either Class VI or VII, with severe or very severe limitations which make them unsuitable for cultivation. Prime agricultural soils are not significantly present in Lynnfield, which explains why no land is classified as Agriculture (MGL Chapter 61A). The most problematic aspect of the majority of Lynnfield's soils is that they are poorly suited for septic tank absorption fields, upon which most residences depend. This is especially true of the areas surrounding

Pillings Pond, Reedy Meadow and upper Chestnut Street. Slope limits much of the undeveloped land area.

Approximately 50 percent of the Town of Lynnfield is composed of the Paxton-Montauk-Urban land association, characterized as deep, well drained, loamy soils formed in glacial till. The slow or very slow permeability of the substratum limits the use of the Paxton soils for septic tank absorption fields or for most types of recreational development. The firmness of the substratum and wetness limit shallow excavations. Slope and small stones on the surface limit playground development. The Paxtons form the largest complex, dominating north and central Lynnfield (see Map 2B for all development limited soils).

The Merrimacs are well suited for farming, habitat and development, but are limited as a filter for septic tank absorption fields. These soils lie on the east-central border, the northwest corner, and abutting the Freetown mucks in central Lynnfield.

Wetness makes the Freetown soils poor or unusable for sites for dwellings, commercial buildings, septic tank absorption fields and shallow excavations. Freetown soils are wetland soils, comprising Reedy Meadow, the area around Beaverdam Brook and in small areas of the northwest corner.

Depth to bedrock makes the Chatfield soils unsuitable as foundations for dwellings, commercial buildings, septic tank absorption fields or shallow excavations. Wetness caused by the water table limits the soil for most types of recreational development. Slope is an added limitation for playground development. Seasonal high water table limits the soil as a site for dwellings, small commercial buildings, shallow excavations or septic tank absorption fields. The rapid permeability of the substratum causes a hazard of groundwater contamination in areas used for septic tanks. South Lynnfield is dominated by the Chatfield complex.

Canton soils have few limitations, excepting their poor performance as filters for septic system effluent. These soils are located primarily parallel surrounding Route 128 and Route 129 in South Lynnfield and lower central Lynnfield.

Existing development indicates that the septic system limiting aspects of these soils will not preclude future development, and so special attention should be paid to acquiring open space parcels surrounding significant wetlands and water bodies to protect them from nutrient loading and possible eutrophication. Water districts should be carefully monitored if down gradient from developments on septic system limited soils, due to probable groundwater contamination by fecal-coliform bacteria.

Methodology

Maps were compiled from USGS (United States Geologic Survey) Topographical Quadrangles for Reading and Salem which served as base maps, Natural Resource Conservation Service (formerly Soil Conservation Service) maps from Southern Essex County report, Scenic Resources Inventory from Massachusetts Department of Environmental Management and Lynnfield Historical Commission data. The soils map was transposed by hand from the soil survey maps onto the base map. All scenic, historical and cultural data were transposed by hand onto the base map.

Soil limitation data were obtained from the NRCS survey of Southern Essex County; elevations and geographic features were obtained from USGS topographic maps and anecdotal information; bedrock descriptions were obtained from USGS bedrock maps of Massachusetts.

Resources

United States Department of the Interior, Geological Survey. 1983. Bedrock Geologic Map of Massachusetts (Sheet 1).

Massachusetts Department of Environmental Management. n.d. Massachusetts Scenic Landscape Inventory.

United States Department of the Interior, Geological Survey. 1987. Reading, Massachusetts Topographical Quadrangles, No. 42071-E1-TM-025.

United States Department of the Interior, Geological Survey. 1985. Salem, Massachusetts Topographical Quadrangle, No. 42070-E7-TM-025.

United States Department of Agriculture, Natural Resource Conservation Service. 1981. Soil Survey of Essex County, Massachusetts, Southern Part.

Contacts

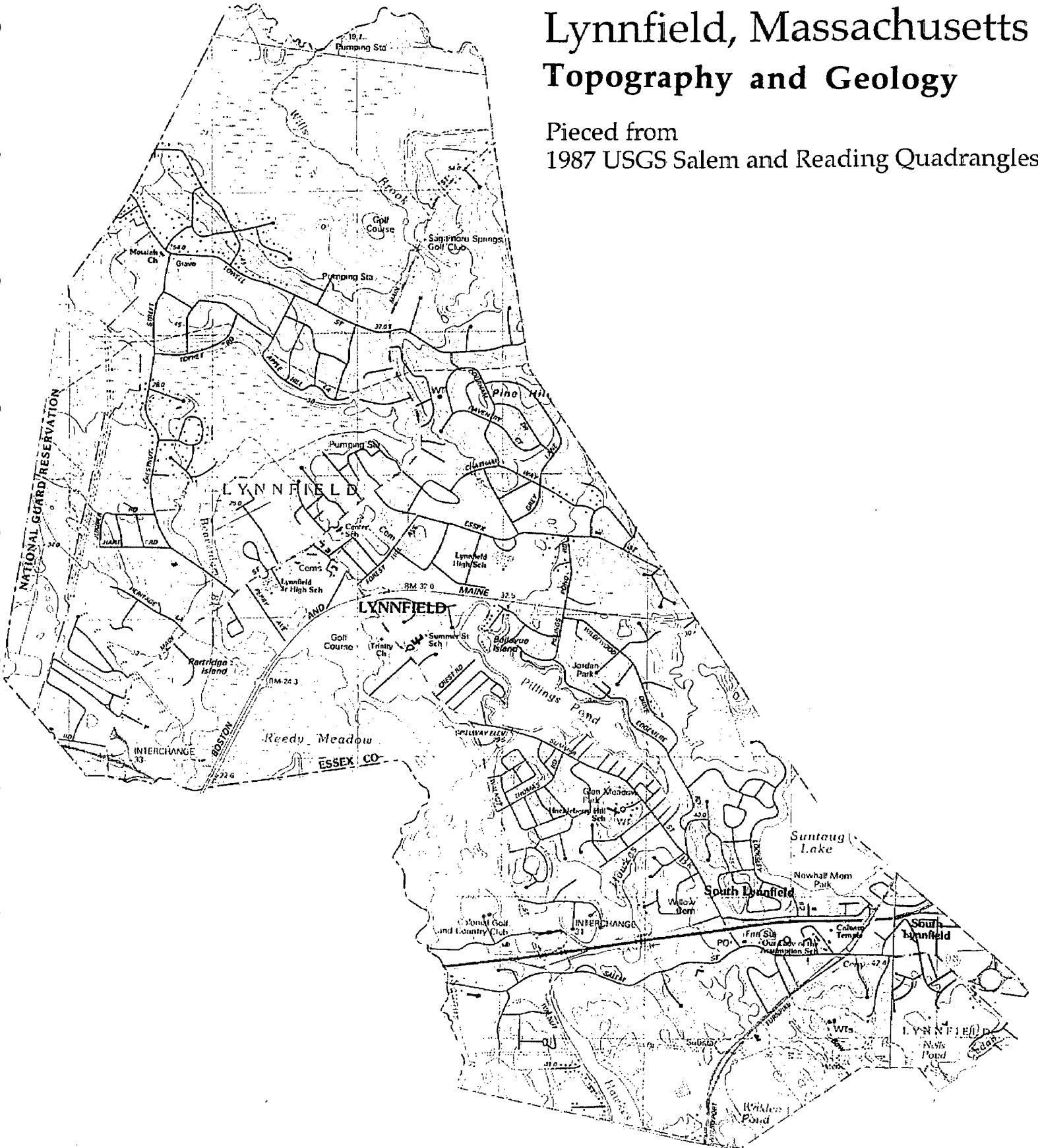
Massachusetts Department of Environmental Management: (617) 727-3160

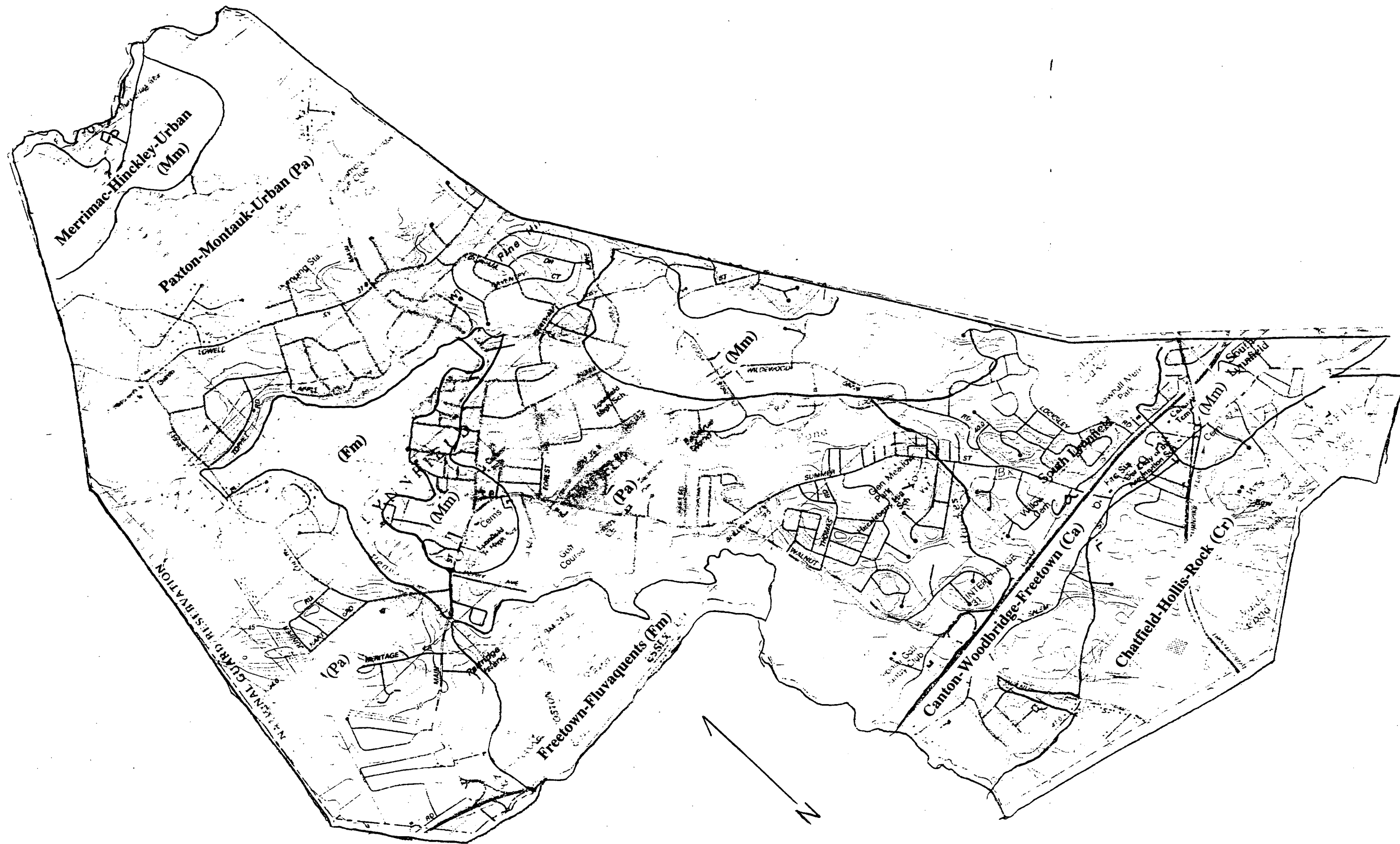
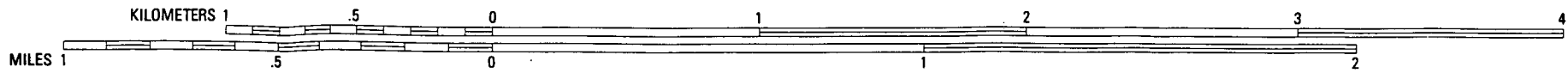
Barbara Drozek, Lynnfield Historical Commission: (617) 334-3826

Betty Adelson, Lynnfield Conservation Commission Administrator: (617) 334-2054

Lynnfield, Massachusetts Topography and Geology

Pieced from
1987 USGS Salem and Reading Quadrangles

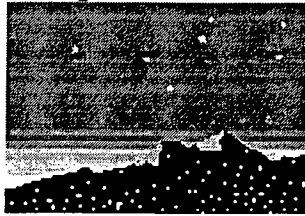




SCALE 1:25 000
 1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND
 CONTOUR INTERVAL 3 METERS

Map 2B. Development Limited Soils.

Section IV-C2 Landscape Characteristics



Much of Lynnfield's character is derived from its physical setting. With gently undulating terrain ranging from the highs of Pine Hill to the beautiful marshes of Reedy Meadow, the present open space contributes greatly to the standard of living within the town. The marshes and wetlands, such as Reedy Meadow, provide stunning views of precious and rich habitat.

Some of the most notable natural landmarks are Reedy Meadow, Pine Hill, Suntaug Lake, Pillings Pond and the areas surrounding Beaverdam Brook. Reedy Meadow is a nationally recognized scenic resource and a National Natural Landmark, with its wetlands acting as home to many rare and endangered species (see Map 2C). The Lynnfield ponds, as discussed further in the Water Resources section, contribute greatly to the scenic resources of the town.

Methodology

All landscape characteristic information was obtained anecdotally, through Lynnfield Conservation Commission files, the Massachusetts Scenic Landscape Inventory or from USGS Topographical Quadrangles.

Resources

Massachusetts Department of Environmental Management. n.d. Massachusetts Scenic Landscape Inventory.

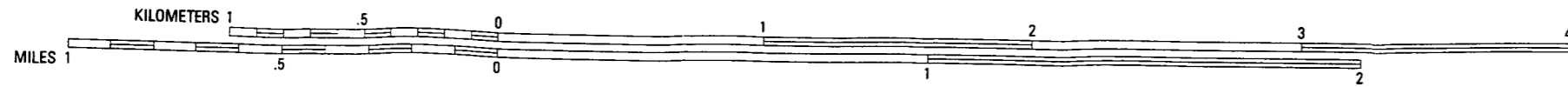
United States Department of the Interior, Geological Survey. 1987. Reading, Massachusetts Topographical Quadrangle, No. 42071-E1-TM-025.

United States Department of Agriculture, Natural Resource Conservation Service.
1981. Soil Survey of Essex County, Massachusetts, Southern Part.

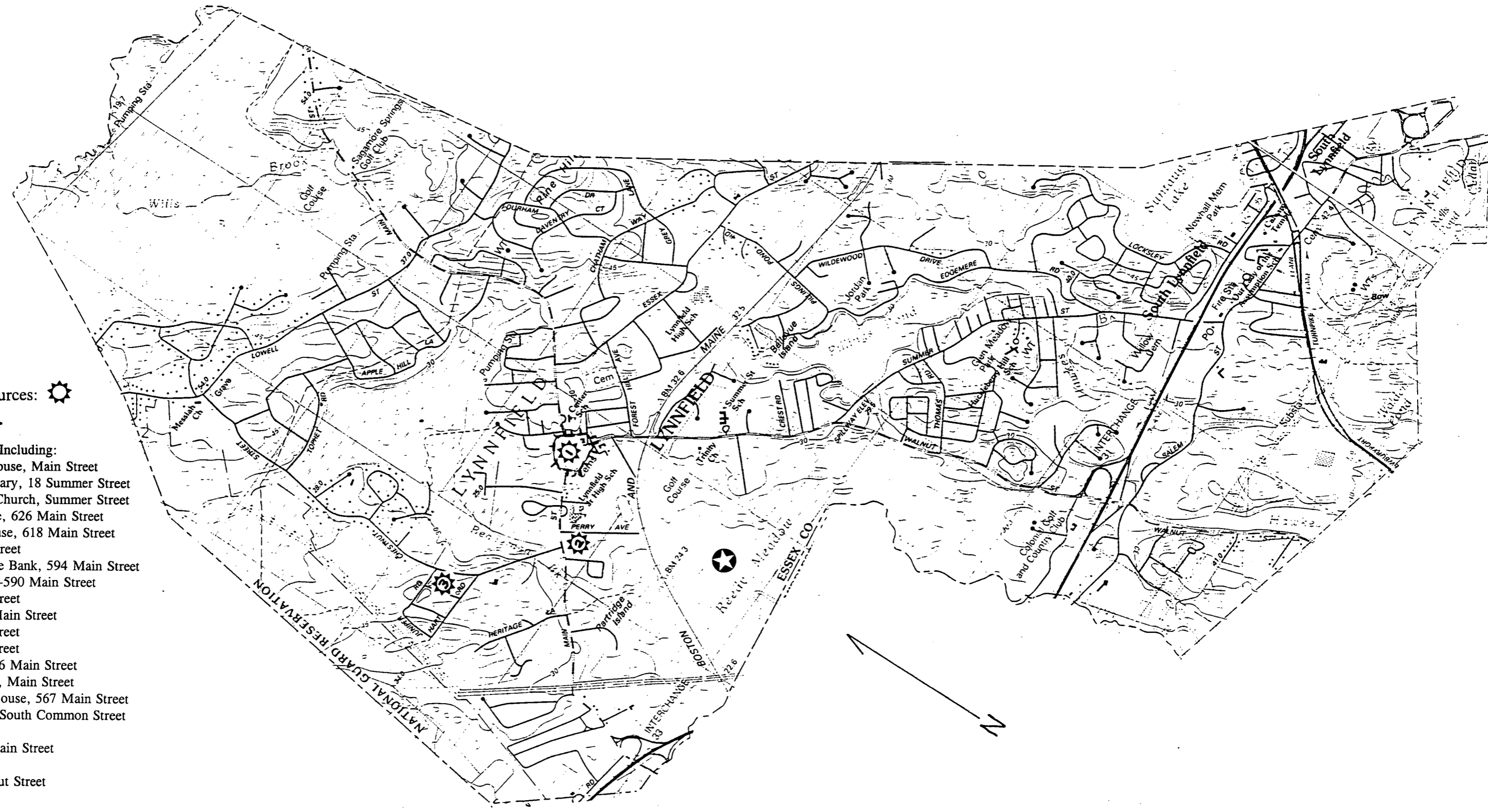
Contacts

Massachusetts Department of Environmental Management: (617) 727-3160

Betty Adelson, Lynnfield*Conservation Commission Administrator: (617) 334-2054



SCALE 1:25 000
 1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND
 CONTOUR INTERVAL 3 METERS



Legend:

● Scenic Resource: ★
 1. Reedy Meadow

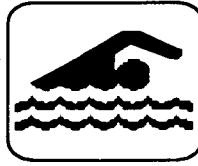
● Cultural and historic resources: ☀
 Historic District Boundary ———

1. Lynnfield Historic District Including:
- Lynnfield Meeting House, Main Street
 - Lynnfield Public Library, 18 Summer Street
 - Centre Congregational Church, Summer Street
 - John Bryant III House, 626 Main Street
 - Johnathan Bryant House, 618 Main Street
 - House at 600 Main Street
 - Wakefield Cooperative Bank, 594 Main Street
 - Shopping Center, 584-590 Main Street
 - House at 580 Main Street
 - Old Parsonage, 574 Main Street
 - House at 568 Main Street
 - House at 562 Main Street
 - Whittredge House, 556 Main Street
 - West Burying Ground, Main Street
 - Rev. Joseph Mottey House, 567 Main Street
 - Old Burying Ground, South Common Street

2. The Henfield House, 300 Main Street
 3. The Hart House, 172 Chesnut Street

Map 2C. Scenic, Cultural and Historic Resources

Section IV-C3 Water Resources



Surface Water (See Map 3A)

The Saugus River

The Saugus River forms Lynnfield's southern and western boundary. It drains a 38 square mile area, originates at Lake Quannapowitt in Wakefield, flows east and south, and eventually empties into Lynn Harbor (see Map 3B for drainage sub-basins of Lynnfield). This river can be characterized as flat and sluggish, with several marshy areas (Reedy Meadow, Mill River and areas directly upstream and downstream of Route 1) that have the capacity to store large volumes of flood water. Over the last few decades, however, the upper portion of the Saugus River (Reedy Meadow and Beaverdam Brook) has become progressively less defined due to sedimentation and vegetative growth. As a result, the River and its channels have a lower flood storage capacity (see Map 3C for Lynnfield flood zones).

Before entering Reedy Meadow, the Saugus River merges with Walkers Brook. The 100-year old Saugus River dam, also known as Lynn Waterworks, is located at the outlet of Reedy Meadow and controls the release of water downstream via two sluice gates. The sluice gates allow the passage of water in two directions; one diverts water to Hawkes Pond (one source of Lynn's water supply) and the other allows water to flow directly downstream along the main stem of the Saugus River. The dam is considered to be a contributing cause of upstream flooding because of its limited discharge capacity.

Beaverdam Brook

Beaverdam Brook originates in the north central portion of the town and flows southwest into Reedy Meadow and the Saugus River. The Brook is entirely within the town of Lynnfield. The Brook drains an area roughly bounded by Chestnut, Lowell and Main Streets. The majority of the drainage basin for Beaverdam Brook is characterized by swampy environments. The Phillips Road wellfield and the Trog Hawley Wells are located in Beaverdam Brook's watershed. The Brook received its name because it was originally a beaver dam.

Bates Brook and Pillings Pond

Pillings Pond is an 88.3-acre man-made pond. Although both Bates Brook and Pillings Pond are entirely within the Town of Lynnfield, their associated watershed drains an additional 200 acres from the City of Peabody. The drainage basin to the south of the pond, and that portion of the drainage basin in Peabody, are fully developed residential areas. The remainder of the drainage basin is being developed for residential use, with only the major wetland areas secure from development. The portion of the drainage basin in Peabody was sewered nearly twenty years ago, while the area of the drainage basin in Lynnfield is not sewered. Many of the houses around the lake, which were originally summer cottages with cess pools, have now become full-time residences. As houses change ownership, septic systems will slowly come into Title V compliance to the extent that its regulations are correctly enforced. Title V is the regulation under Massachusetts General Law that requires that septic systems be updated when property is sold.

The elongated shape of the pond is irregular with numerous small coves that encourage collections of algae masses and shelter waterlily growth from wave action. The maximum depth of the Pond is no greater than six feet, which is too shallow to be stratified. Bates Brook enters Pillings Pond from the north and is the

Pond's only year round tributary. A second small intermittent stream enters the Pond from the south.

Suntaug Lake

Suntaug Lake is 154 acres and is divided from the northwest to the southeast by the boundary of the City of Peabody. Humphrey's Island, a small wooded island in the center of the Lake, is also divided between the two towns. The western and southern areas surrounding the lake are heavily developed residential areas. In addition, Route 1 and Route 128 brush the southern part of the Lake.

Robinson's Brook

Robinson's Brook flows into Beaverdam Brook at the edge of Reedy Meadow. Its drainage area is minor.

Hawkes Pond

Hawkes Pond is at the southern Lynnfield/Saugus Border. The Pond is 73 acres and accounts for the only drinking water supply taken from surface water originating from the Saugus River. One half million gallons per day are diverted from the Saugus River to Hawkes Pond via a sluice gate dam. The diversion (originally authorized in 1893) provides 70 percent of Lynn's water supply. The Hawkes Pond withdrawals are permitted under the Massachusetts Water Management Act, and not under the Inter-Basin Transfer Act because both Lynn and Hawkes Pond are in the North Coastal Basin. Hawkes Pond has no operable outlet, and therefore the ability to regulate water levels in the Pond is based solely on pumping to another Lynn reservoir. As a result, Hawkes Pond provides no flood control advantage to the upper portion of the Saugus River.

The Ipswich River and Wills Brook

The Ipswich River forms the northern border of Lynnfield. The River is characterized by its low relief and low lying, slow draining swamps and marshes, with its headwaters originating in Wilmington. Wills Brook rises from a stream and empties into Wills Meadow, which empties into the Ipswich River. Lynnfield's Main Street well is located in the Wills Brook watershed. The Ipswich River is the source of water for 20 towns and cities in the North Suburban/North Shore area. Water withdrawals exacerbate a low-flow problem in the summer and autumn months.

The Sagamore Spring and The Pocahontas Spring

The Sagamore Spring and the Pocahontas Spring are in the Ipswich River watershed. The Sagamore Spring originates within the Sagamore Golf Course in the northeastern portion of town. The Pocahontas Spring is located in Wills Brook on Lowell Street. The Pocahontas Spring has been used to provide water commercially since 1902.

Wetlands (See Map 3A)

Reedy Meadow

Reedy Meadow is a 540-acre cattail marsh that lies on both sides of the Saugus River. Approximately three quarters of Reedy Meadow is in Lynnfield, with the remaining quarter in Wakefield. The Meadow's name is derived from the large quantity of plumed reeds it contains. Drainage from the towns of Reading, Wakefield and Lynnfield form the Meadow's watershed. The Meadow is home to a range of wildlife including several rare and threatened species (see Wildlife section). The Meadow is designated as a Class A water source under Massachusetts Surface Water Quality Standards.

Cedar Swamp

Cedar Swamp begins at the eastern boundary of Reading and crosses into Lynnfield at the farthest upstream reaches of Beaverdam Brook. The northern upland regions abutting the swamp form the drainage divide between the Ipswich and Saugus River Watersheds.

Aquifers And Water Supply (See Map 3A)

Lynnfield is served by two water districts: the Lynnfield Center Water District, which is supplied by local groundwater sources, and the Lynnfield Water District which purchases water from the Massachusetts Water Resources Authority (see Map 3D for water protection districts). The Lynnfield Center Water District serves over 80 percent of the town's residents. All three wells are in gravel aquifers (see Table I below for construction dates, addresses and pumping capability of wells presently on line). Additionally, several artesian wells with depths of 900-1000 feet are permitted to go online in the Wills Brook area during the summer of 1997. They have an expected pumping capacity of 800,000 gallons a day. All of Lynnfield's wells have twenty year permits, with five year reviews, under the Water Management Act. None of the wells required an Inter-Basin Transfer permit under the Massachusetts Inter-Basin Transfer Act because Lynnfield is in both the North Coastal and Ipswich River basins.

Water Resources Table I: Town Well Information

<i>Wells Presently on Line</i>	<i>Construction year</i>	<i>Well depth</i>	<i>Pumping capacity</i>
Pumping Station No. 1 83 Phillips Road	1940	50 feet	400 Gallons Per Minute
Pumping Station No. 2 1100-1200 Main Street	1959	70 feet	375 Gallons Per Minute
Pumping Station No. 3 83 Phillips Road	1981	100 feet	396 Gallons Per Minute

Methodology

The water resource narrative information was obtained from several studies (see Resources), interviews (see Contacts) and information from the USGS Quadrangle maps.

Resources

Camp Dresser and McGee (CDM). 1992. Saugus River Flood Control Improvements: A Report to the Saugus River Watershed Committee.

Dunne, T. and L. Leopold. 1978. Water in Environmental Planning. New York: W. H. Freeman.

Federal Emergency Management Agency. 1990. Flood Insurance Study: Town of Lynnfield, Massachusetts.

Lynnfield Board of Water Commissioners. 1996. Fifty-seventh Annual Report of the Officers of the Lynnfield Center Water District.

Lynnfield and Wakefield, Massachusetts Conservation Commissions. March 1994. ACEC Nomination Proposal for Lynnfield Marsh (Reedy Meadow).

Metropolitan Area Planning Council. 1992. North Suburban Water Supply Protection Plan.

Tashiro, J., R. Schmidt, et al. 1991. Baseline Assessment of the Saugus River System, Massachusetts. Annendale-on-Hudson: Hudsonia Limited.

Contacts

Kerry Mackin, Ipswich River Watershed Association: (508) 356-8939

Kenny Burnham, Lynnfield Water Department: (617) 334-3901

Cindy DelPappa, Saugus River Watershed Council: (617) 233-5046

TOWN OF LYNNFIELD - WATER RESOURCES

FRESH & SALT WATER WETLANDS ZONE IIs - INTERIM & APPROVED

FRESH WATER NON-FORESTED WETLANDS
 SALT WATER NON-FORESTED WETLANDS

INTERIM ZONE II
 APPROVED ZONE II

MEDIUM & HIGH YIELD AQUIFERS PUBLIC WATER SUPPLIES

MEDIUM YIELD AQUIFER
 HIGH YIELD AQUIFER

* PUBLIC WATER SUPPLIES INCLUDING GROUND & SURFACE WATER

DATA SOURCES:

WETLANDS
 Extracted from MassGIS land use data layer. Land use and land cover interpreted from 1985 aerial photography and automated by Resource Mapping Group of the Univ. of Massachusetts - Amherst at 1:25,000 scale.

AQUIFERS
 From the USGS 1:48,000 hydrologic atlas series on ground water favorability. Definitions of high and medium yield (measured in gallons per minute) vary between basins.

For most basins, medium yield is between 100 and 300 GPM and high yield is above 300 GPM.

PUBLIC WATER SUPPLIES

These ground and surface water supply locations were automated by the Mass. Dept. of Environmental Protection, Division of Water Supply, using coordinates in the State Water Use Database System enhanced with data from the DEP Water Supply Protection Atlas. Data has been checked for 10 DEP regions except the Northeast.

ZONE II - INTERIM and APPROVED
 Compiled by Mass. Dept. of Environmental Protection, Division of Water Supply. Any proposed wet which will pump a total 100,000 gallons per day must have Zone I designation completed and approved by DEP prior to coming on line. In the absence of a DEP approved Zone I for any well, DEP has accepted the 1/2 mile Interim Wetland Protection Area or Interim Zone I.

ROAD SYMBOLS

Interstate Highways
 US Routes
 State Routes
 Secondary Roads
 Trails

OTHER STANDARD SYMBOLS

Town Boundary
 Major Basin Boundary
 Basin System Boundary
 Focus Area

Prepared and published by
MASS GIS
 COMMISSIONER JOHN PHILLIPS

PRODUCED BY:
 1994-03-15
 10:00 AM
 10:00 AM
 10:00 AM
 10:00 AM
 10:00 AM

MASS GIS

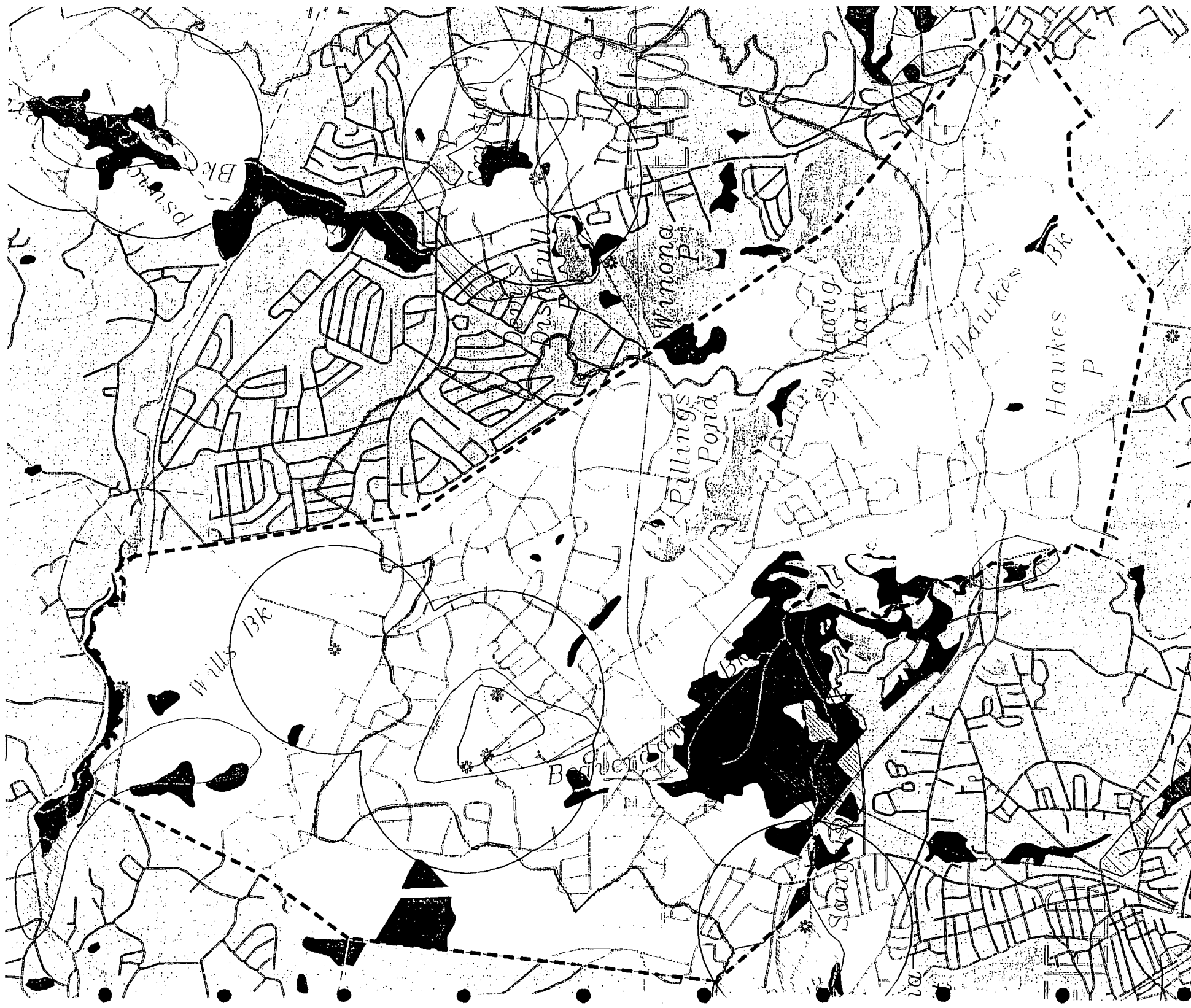
Massachusetts
 Geographic
 Information
 System

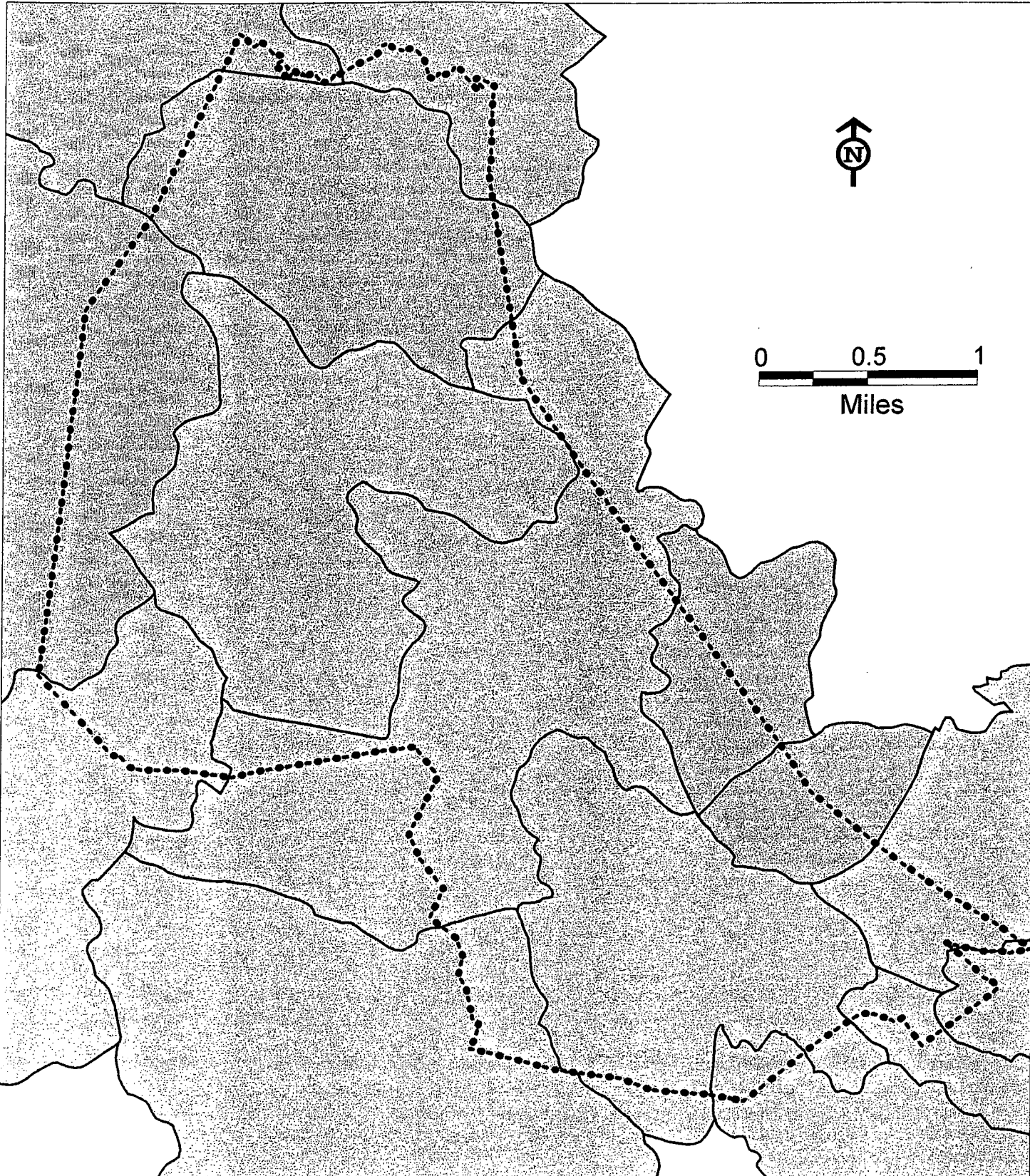
Massachusetts Executive Office of Environmental Affairs - 1993



SCALE 1:20,000

Map 3A: Water Resources of Lynnfield





DRAINAGE SUB-BASINS OF LYNNFIELD

MASSGIS "SUB-BASIN" NAD27 DATALAYER PRODUCED BY ESSEX COUNTY ORS 4-97

- IPSWICH
- NORTH COASTAL

ZONE EXPLANATION

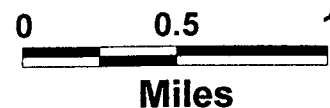
A = AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.

A1 - A30 = AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED (denoted on map by numerical values of elevation in feet).

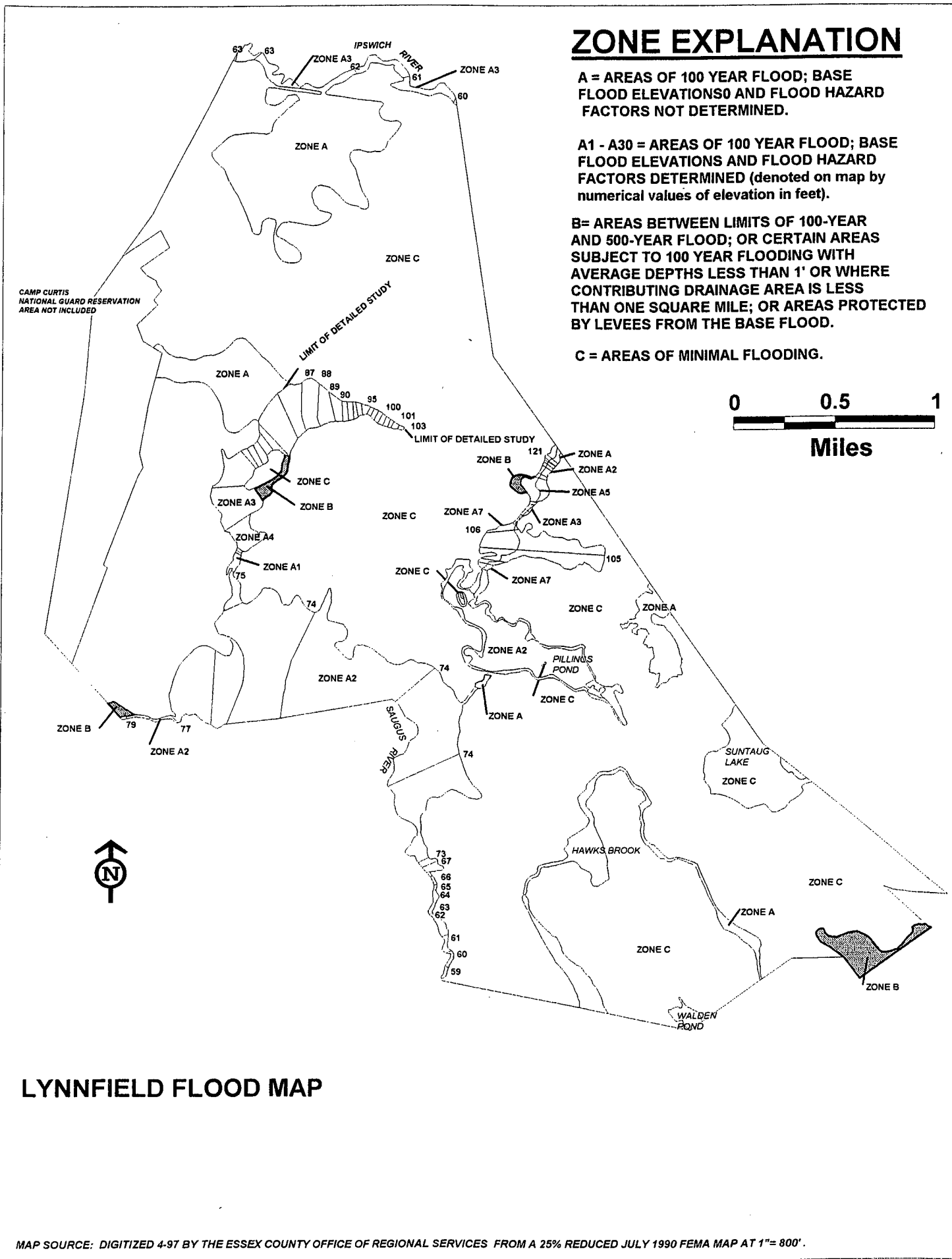
B = AREAS BETWEEN LIMITS OF 100-YEAR AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100 YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN 1' OR WHERE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.

C = AREAS OF MINIMAL FLOODING.

CAMP CURTIS NATIONAL GUARD RESERVATION AREA NOT INCLUDED



LYNNFIELD FLOOD MAP



LYNNFIELD WATER PROTECTION DISTRICT



WATER PROTECTION DISTRICT BOUNDARY



MAP SOURCE: DIGITIZED BY THE ESSEX COUNTY ORS FROM TRACED
BASE MAP OF UNKNOWN SCALE, PROJECTION, AND QUALITY 4-97

FOR GENERAL REFERENCE ONLY.

Section IV-C4 Vegetation



Forest land

Lynnfield is located within the forest vegetation zone of Transition Hardwoods - White Pine - Hemlock, located between the Spruce-fir/Northern Hardwood forests of northern New England and the Oak-Hickory-Yellow Poplar woodlands that dominate from central Connecticut south. Also referred to as an Oak-Conifer forest, it is dominated by Northern Red Oak, White Pine, Eastern Hemlock, Red Maple and American Beech, and also may include Black and White Birch, Black Cherry, White Ash and Sugar Maple. This type of forest typically grows on well-drained, nutrient-poor, relatively thin soils over acidic bedrock.

Wooded areas in the town include the Pine Hill Lot, the Bennett Keenan Conservation Area, the Beaverdam Brook Conservation Area, the Bow Ridge Conservation Area and Jordan Park.

General inventory

Fifteen vernal pools located in Lynnfield have been certified by the Natural Heritage Program of Massachusetts. Vernal pools are temporary, isolated bodies of freshwater that provide critical habitat for many vertebrate and invertebrate wildlife species. They are surrounded by species typical of wooded swamps such as Red Maple, Buttonbush, Highbush Blueberry, Swamp Azalea and Sweet Pepperbush, as well as several fern, sedge, rush and grass species.

Reedy Meadow represents an example of a freshwater marsh of predominantly cattail, with associated phragmites, sedges, grasses, rushes and other

species of emergent marsh vegetation at its edges. It is one of the largest Typha (cattail) marshes in the state of Massachusetts. During site visits conducted by Hudsonia Limited, Essex County Greenbelt Association, Massachusetts Audubon Society and the U.S. Park Service, the following plant species were identified: Arrowhead, Rabbit's Foot Clover, Spotted Wintergreen, Daisy Fleabane, White Daisy, Yellow Pond Lily, Yarrow, Vetch, Meadow Sweet, Goldenrod, Queen Anne's Lace, Butter and Eggs, Canada Mayflower, Star Flower, St. John's Wort, Indian Pipes, Purple Loosestrife, Pale Smartweed, Mullein and White Clover. Shrubs found included: Buttonbush, Sweet Pepperbush, High Bush Blueberry and Swamp Honeysuckle (Azalea). Tree species included: Glossy Buckthorn, Sassafras, Willow, Birch, Cottonwood, Juniper, White Pine, Red Maple, Red Oak and Alders. Vines included: Black Raspberry, Woodbine, Partridge Berry, Poison Ivy, Wild Grape, Ground Pine and Ground Nut.

Rare, Threatened, Endangered, and Special Concern Species

Four species of vascular plants found in Lynnfield have been given protection status by the state of Massachusetts. Purple Needlegrass (*aristida purpurascens*) has been designated as a Threatened species; Glaucous Sedge (*carex livida var radicaulis*) has been designated as Endangered; Large Whorled Pogonia (*isotria verticillata*) has been placed on the Unofficial Watch List; and New England Blazing Star (*liatris scariosa var novae-angliae*) is considered a species of Special Concern.

Species Descriptions

Glaucous Sedge (Carex livida var. radicalus)

Sedges are grass-like, clump-forming rhizomatous perennial herbs that are generally found in marshes or wetland areas. The Glaucous Sedge is listed as an Endangered species in Massachusetts.

New England Blazing Star (Liatris scariosa var. novae-angliae)

This is a herbaceous perennial plant, of 12 to 39 inches, with tall purple spikes of flower heads. It occurs in open areas with dry, sandy, low nutrient soils that support early to mid-successional communities. New England Blazing Star prefers frequent disturbance, and has lost habitat to widespread succession of open grasslands and heathlands to forests. It is currently listed as a species of Special Concern in Massachusetts and is a candidate for federal listing.

Purple Needlegrass (Aristida purpurascens Poir.)

This perennial averages one to one-and-a-half foot stems which branch out from the base. This variety is distinguished by the dark purple-brown color of the flower which can extend for one-third to one-half of the plant's height. This shade-intolerant species favors dry, nutrient-poor, sandy areas such as heathlands and sandplain grasslands. Purple Needlegrass is listed as Threatened in Massachusetts due to the widespread succession of grasslands and open fields to woodlands.

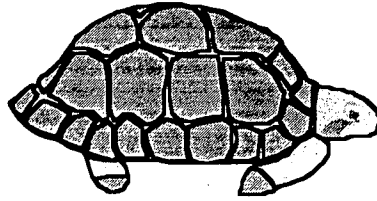
Whorled Pogonia (Isotria verticillata (Willd.) Raf.)

This small orchid ranges from 3 to 14 inches in height and produces yellowish-green flowers with large purple sepals in May and June. Its habitat is the moist edges of red maple swamps and dry oak forests; preferential soil type is an acid or circumneutral. Once listed as a rare species in Massachusetts, this species is now on the Unofficial Watch List.

Note: See Wildlife section (Section IV-C5) for Methodology, Resources and Contacts

Section IV-C5

Wildlife



General Inventory

Reedy Meadow, and its surrounding second growth fields, is habitat for many common animals including muskrats, mice, rabbits, foxes, raccoons, deer, frogs and toads, turtles, snakes and salamanders. A pair of moose have even been sighted. A 1981 study performed by Interdisciplinary Environmental Planning, an environmental consulting firm, documented the following birds as present in the Meadow: American Bittern, Killdeer, Long-billed Marsh Wren, Eastern Bluebird, Ring-Necked Pheasant, Cedar Waxwing, Brown-headed Cowbird, Sora Rail, Red-headed Woodpecker, Brown Thrasher, Redwinged Blackbird, Swamp Sparrow, Common Grackle, Rufous-sided Towhee, Song Sparrow, Grey Catbird, Common Yellow Throat, Cedar Waxwing, Field Sparrow, Virginia Rail and White Throated Sparrow. Those species believed to be permanent residents included American Kestrel, Red-Tailed Hawk, Common Flicker, Common Crow, Dark-eyed Junco, Red-Shouldered Hawk, Yellow-rumped Warbler, Black Duck, Canada Goose, Great Horned Owl, Mallard, Fish Crow, Starling, American Goldfinch and Osprey. Reedy Meadow, however, has been described as a virtual "habitat island" within an otherwise highly developed community.

Corridors

There do not appear to have been any scientific studies done to determine the existence of significant wildlife corridors in Lynnfield. Given that Reedy Meadow

has been described as a "habitat island," it is unlikely that there are any viable connective corridors between the Meadow and any other habitat area in the town.

Rare, Threatened, Endangered and Special Concern Species

Reedy Meadow has been listed since 1988 as a Rare Wetlands Habitat by the Natural Heritage and Endangered Species Program within the state Division of Fisheries, Wildlife and Environmental Law Enforcement. The majority of the listed wildlife species in Lynnfield can be found in the habitat of the Meadow. These include the Endangered -- American Bittern, Common Moorhen, Least Bittern and Pied-Billed Grebe; the Threatened -- King Rail and Marbled Salamander; and species of Special Concern -- Spotted Turtle, Blue Spotted Salamander and Osprey. The major threats to the survival of these species are the loss of wetlands habitat to development, and the contamination from pollution runoff. The protection of Reedy Meadow as a critical habitat is essential to the survival of Lynnfield's listed wildlife species.

Additional listed species found in Lynnfield according to the Natural Heritage Program, although outside the habitat of Reedy Meadow, include the Endangered -- Henslow's Sparrow, Sedge Wren and Copperhead.

Species descriptions

American Bittern (Botaurus lentiginosus)

This is a medium-sized, brown, streaked, ground-dwelling heron. It inhabits freshwater or brackish wetlands that are dominated by tall marsh plants such as cattails, bulrushes, sedges and grasses. Its preferred foods include frogs, small snakes and eels, salamanders, crayfish, mice and grasshoppers on which it feeds in marshes, meadows and along edges of shallow ponds. It is classified as a species of Special Concern in Massachusetts. Disturbance and destruction of wetland habitat are the major causes for its shrinking populations.

Blue-Spotted Salamander (Ambystoma jefferesianum)

This salamander averages 6.25 inches in length and is distinguished by the blue markings on its sides. Preferred habitat is a mix of deciduous woods with swamps, pools and slow streams. This species is currently listed as a species of Special Concern in Massachusetts.

Common Moorhen (Gallinula chloropus)

A migrating slate-grey, duck-like swimming bird, the Common Moorhen averages 13 inches in length and is easily identified by a distinctive red bill with a yellow tip and red frontal shield. This bird arrives in Massachusetts in late April and migrates south in October. Nesting habitats include large freshwater marshes and ponds with cattails; this species prefers the concealment offered by dense vegetation. Preferred foods include grasses, sedge seeds and insects. The Common Moorhen is listed as a species of Special Concern in Massachusetts. The continued reduction of available shallow freshwater marsh habitats due to drainage and development is believed to be the primary cause of the Common Moorhen's dwindling population.

Copperhead (Agkistrodon contortrix)

The copperhead is a hazel-brown snake that averages 40 inches in length with chestnut-brown patches that are narrow in the middle of the back and broad on the sides. In the winter, this snake hibernates in rocky slopes, and in summer is found in woods, fields and swamps. Diet includes frogs, snakes and mice. Though the Copperhead has not been sighted in Lynnfield for over one hundred years, this species remains listed as Endangered in Massachusetts because Massachusetts represents the northern-most range of this species.

Henslow's Sparrow (Ammodramus savannarum)

Also known as the Grasshopper Sparrow, this small (5.5 inches in length) sparrow has an unstreaked breast, short tail and a relatively flattened head. This migrating bird nests on the ground in open fields and cultivated pastures. The preferred diet is primarily grasshoppers, caterpillars, ants, spiders and snails, though it also consumes weed seeds. This species is listed as Endangered in the state of Massachusetts.

King Rail (Rallus elegans)

Largest of the New England rails, this is a plump, chicken-sized marshbird. It inhabits large freshwater and brackish marshes dominated by cattails and other emergent vegetation. The King Rail is listed as Threatened in Massachusetts. The loss of wetland nesting and feeding habitat is the major factor threatening this species.

Least Bittern (Ixobrychus exilis)

The smallest member of the heron family, this is a colorful and vocal bird. Suitable habitats include fresh and brackish water marshes with tall, dense emergent vegetation and clumps of woody plants. The Least Bittern is classified as Endangered in Massachusetts. The destruction of wetland habitat is the greatest threat to this species. Its wetland habitat also needs to be protected from chemical contamination, siltation, eutrophication and other pollutants. If wetlands remain undisturbed and unpolluted, Least Bitterns seem tolerant of human presence and can persist in urbanized areas.

Marbled Salamander (Ambystoma opacum)

This black salamander with light markings that traverse the back, neck and tail averages 4 inches in length. Habitat is primarily the borders of ponds and slow streams with sandy and gravelly areas. This species is currently listed as Threatened in Massachusetts.

Osprey (Pandion haliaetus)

Also referred to as the Fish Hawk, this dark brown hawk with a white breast may also be seen with white on the top of the head. Its average length is 24.5 inches and its wingspread is 66 inches. This hawk nests on poles, trees and even on the ground, and a pair will return to the same nest every year. Diet consists exclusively of fish, which explains the Osprey's need to be near a body of water. The Osprey experienced a population decline due to the effect of the pesticide DDT and is currently listed on the Unofficial Watch List in Massachusetts.

Pied-billed Grebe (Podilymbus podiceps)

This migrating waterbird is characterized by a stocky 12-15 inch long body, short legs, a short tail, and a stout, thick, chicken-like bill; plumage changes with the seasons. Arriving in Massachusetts in late March and migrating southward in September, the bird's nesting habitat includes marshes, lakes and large ponds with an abundant supply of vegetation such as reeds and cattails for cover and nesting materials. The preferred diet includes seeds, frogs, tadpoles, aquatic insects, vegetation and fish. Classified as Threatened in Massachusetts, this species is threatened by dwindling wetland habitats.

Sedge Wren (Cistothorus platensis)

This small (4 to 4.5 inches in length) brown bird is characterized by a white streaked head, a short cocked tail and a short slender bill. This migrating bird inhabits

the dry, transitional edges of freshwater marshes, bogs and wet meadows. The Sedge Wren prefers insects such as grasshoppers, beetles, moths, ants, caterpillars and spiders. This species, currently listed as Endangered in Massachusetts, has been negatively impacted by the continuing loss of wetlands habitat to development and degradation.

Spotted Turtle (Clemmys guttata)

Also known as the polka-dot turtle, this species is relatively small with bright yellow circular spots dotting its smooth black upper shell. It inhabits a variety of wetland habitats including marshy meadows, bogs, small ponds and brooks, ditches and woodland vernal pools. It requires a soft substrate and prefers areas with aquatic vegetation. The Spotted Turtle is classified as a species of Special Concern in Massachusetts. Development and habitat fragmentation are the greatest threats to the species, including residential development, construction of new roads, alteration of wetlands and destruction of upland habitats.

Recreation Issues for Vegetation and Wildlife

Reedy Meadow, an area of great scenic value shared by the Towns of Lynnfield and Wakefield, is one of the top birdwatching and nature observation areas in northeastern Massachusetts. The Meadow offers opportunities for hiking, walking, skating, jogging and boating, as well as freshwater fishing and duck hunting. Educational trail walks and outdoor education programs are held in the Meadow. The Reedy Meadow Trail, planned by a trail coordinator from the Massachusetts Department of Environmental Management, leads out to Partridge Island and includes a system of boardwalks. Groups including Massachusetts Audubon, Essex County Greenbelt Association and Brookline Bird Club use the Meadow for natural history study. In addition, the Lynnfield School System, in

cooperation with Massachusetts Audubon, conducts many middle school programs on the wildlife and water resources of the Meadow.

Pillings Pond and Beaverdam Brook provide locations for freshwater fishing. The Jordan Park area offers opportunities for hiking and nature observation.

Methodology (Vegetation and Wildlife)

In our investigation for these sections we discovered that it is relatively difficult to find vegetation and wildlife information that is both current and specific to the Town of Lynnfield. Numerous studies were performed at the turn of the century, but may no longer reflect current conditions. The performance of general botanical and biological assessments appears to be the exception rather than the norm these days, except in special outstanding cases. For example, in an effort to obtain the designation of Area of Critical Environmental Concern (ACEC) status for Reedy Meadow, a proposal was put together that contains specific vegetative and wildlife information (though some of it anecdotal) on the marsh. In addition, the Natural Heritage and Endangered Species Program provides detailed information and maps on all federally and state listed species (Endangered, Threatened, Special Concern and Unofficial Watch List) found within municipal borders.

We used general regional data to determine Lynnfield's forest vegetation zone, to describe vernal pool vegetation and to list common wildlife species found in the area.

Information on the recreational significance of Lynnfield's vegetation and wildlife was obtained from the Reedy Meadow ACEC proposal, from Lynnfield's internet web site, from anecdotal information and from preliminary community survey results.

Resources (Vegetation and Wildlife)

- Benyus, Janine, E. 1989. Field Guide to Wildlife Habitats of the Eastern United States. New York: Fireside.
- Crow, Garrett E. 1982. New England's Rare, Threatened and Endangered Plants. U.S. Department of the Interior Fish and Wildlife Service, Northeast Region/New Hampshire Agricultural Experiment Station and University of New Hampshire.
- Goldin, Alfred J. 1977. Wild Mammals of New England. Baltimore: The Johns Hopkins University Press.
- Leahy, Christopher. 1997. The Nature of Massachusetts. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.
- Lynnfield, Essex County: Community Profiles. Internet -<http://www.magnet.state.ma.us/dhcd/iprofile/164.htm>.
- Lynnfield and Wakefield, Massachusetts Conservation Commissions. March 1994. ACEC Nomination Proposal for Lynnfield Marsh (Reedy Meadow).
- Palmer, Laurence E. (revised by H. Seymour Fowler). 1949 (revised 1975). Field Book of Natural History. (second edition). United States: McGraw-Hill Book Company.
- Yahner, Richard H. 1995. Eastern Deciduous Forest: Ecology and Wildlife Conservation. Minneapolis: University of Minnesota Press.









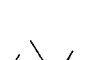
Contacts (Vegetation and Wildlife)

Andrea Arnold, Environmental Review Assistant, Natural Heritage and Endangered Species Program: (508) 792-7270

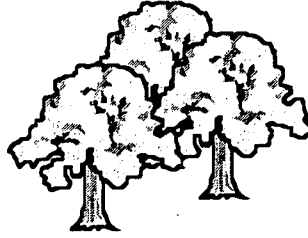
Essex County Greenbelt Association: (617) 768-7406



LEGEND

- | | | | |
|--|--------------------------------------|---|-----------------|
|  | Estimated Habitats of Rare Wildlife | | |
|  | Federal, State, or County Open Space | | |
|  | Local, Private, or Other Open Space | | |
|  | Certified Vernal Pool | | |
|  | Wetlands | | |
|  | Rivers, Streams |  | Roads |
|  | Railroad Tracks |  | Town Boundaries |

Section IV-C6 Scenic Resources And Unique Environments



According to the Massachusetts Department of Environmental Management's Scenic Landscape Inventory, there is only one registered site in Lynnfield -- Reedy Meadow. Reedy Meadow, a 540-acre cattail marsh, is home to a range of migrating birds and many rare species. Reedy Meadow lies on both sides of the Saugus River; drainage from the Towns of Reading, Wakefield and Lynnfield form the Meadow's watershed. The Meadow is surrounded by residential development, two golf courses and some industry.

There are no major characteristic or unusual geological features in the Town of Lynnfield. There are no ACECs currently registered in Lynnfield, however, Reedy Meadow may be a candidate for such a designation.

There are four sites in the Town of Lynnfield listed in the National Register of Historic Places. The Meeting House (1714) and the Meeting House District are perhaps the best known historic sites in the town. The other two listed buildings are The Henfield House (1667), the oldest standing building in Lynnfield, and The Hart House (1672). There are several other buildings, cemeteries, churches and sites around town that are of historical significance, but are not registered (see Optional Maps 1 and 2).

Several artifacts, such as millstones, triangular war arrows, pestles and ax heads, have been found on Partridge Island, a part of Reedy Meadow. It is believed that the Island was the site of a Native American Camp. According to the Massachusetts Historical Commission, there are several other archeological sites in

Lynnfield, however, these sites are not part of the public record. The Massachusetts Historical Commission can survey a land area prior to any decisions that need to be made about land use.

Methodology

All scenic, historic and cultural data was transposed by hand onto the base map. Both the Massachusetts and Lynnfield Historical Commissions were consulted for historical and archeological information. Archeological information was found in the ACEC proposal written by the Lynnfield and Wakefield Conservation Commissions in 1994. The Scenic Landscape Inventory, published by the Massachusetts Department of Environmental Management, was consulted to identify registered scenic resources. Additionally, several printed resources were reviewed to collect historical information.

Resources

Lynnfield Historical Commission. 1995. Guide to Historic Lynnfield.

Lynnfield and Wakefield Conservation Commissions. March 1994. ACEC Nomination Proposal for Lynnfield Marsh (Reedy Meadow)

Massachusetts Department of Environmental Management. Massachusetts Scenic Landscape Inventory.

Wiswall, Marcia Wilson, ed. 1977. Lynnfield: A Heritage Preserved 1895-1976
Canaan, New Hampshire: Phoenix Publishing.

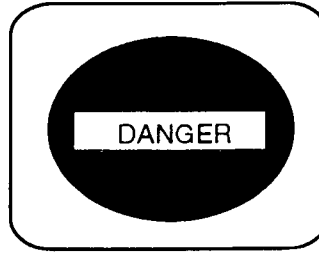
Contacts

Massachusetts Department of Environmental Management: (617) 727-3160

Massachusetts Historical Commission: (617) 727-8470

Barbara Drozek, Lynnfield Historical Commission: (617) 334-3826

Section IV-C7 Environmental Problems



Hazardous Materials, Hazardous Waste and Underground Storage Tanks

Leaks from underground storage tanks and piping are a major cause of soil, groundwater and wetland contamination. Underground storage tank leaks are caused by a number of factors such as defects in tank materials or age, improper installation, corrosive soils, weather conditions or tank fatigue. Unprotected underground storage tanks have an average life expectancy of fifteen years. The Lynnfield fire department, which registers underground storage tanks, has estimated there are between 100 and 200 residential underground storage tanks all of which are over fifteen years old. Additionally, Lynnfield has four larger commercial tanks all of which are less than fifteen years old. Records for underground storage tanks have been obtained through existing record counts and not field data, thus the data may not be accurate.

The Massachusetts Department of Environmental Protection (DEP) has documented one spill originating from an underground storage tank. In 1987, underground storage tanks at The Colonial Hilton Golf and Country Club were found to have leaked volatile organic compounds (VOCs). The tanks and 200 cubic yards of contaminated soil were removed. VOCs were found in the subsequent groundwater analysis. Further remedial measures may be required after the long-term health impact can be determined by the DEP.

Two major highways, Route 128 and Route 1, pass close to several of Lynnfield's surficial water bodies and wetlands. Both of these routes could potentially be the site of a hazardous waste spill.

Flooding

Lynnfield's principal flood problems are localized in nature and result from undersized culverts and sedimentation of Reedy Meadow. Flooding problems are manifested in severe yard flooding, basement seepage and failed septic systems. The flooding occurs in the following Saugus River and Beaverdam Brook areas: Main Street, Lynnfield Center Golf Course, Perry Avenue, Ford Avenue, Meadow Lane, Dale Road, Partridge Lane and Wirthmore Lane.

Incremental filling, as well as artificially-induced eutrophication, has diminished Reedy Meadow's and Beaverdam Brook's flood storage capacity and has restricted water flow. The result has been increased flooding and flood-related damage.

Large privately-owned parcels -- Lynnfield Golf Course, the Colonial Hilton Golf Resort, the Edgewater Office Park and the Partridge Lane Condominiums -- accompanied by other development around Reedy Meadow have resulted in increased runoff. This runoff, sedimentation and increased vegetative growth, have raised the water table and resulted in increased flooding problems and failed septic.

Septage

There is no sewer service in the Town of Lynnfield. All properties in town are on septic systems. Lynnfield's Board of Health septic bylaw has more stringent restrictions than the State's Title V septic regulations, such as a 125-foot setback from wetlands and waterways as compared to the state's 100-foot setback.

As stated in the Geology, Soils and Topography section, Lynnfield is dominated by limited soils for traditional septic systems. The limitations of these soils include poor filtration that may lead to a hazard of groundwater contamination.

Overflowing septage from failed septic systems in the early 1970s caused an incident of fecal coliform bacteria contamination. Outdated septics have also resulted in increased biological oxygen demand (BOD) in Reedy Meadow's surface water and in Pillings Pond. This subsequently threatens fish and other organisms.

Causes of failing septic systems include improper siting, installation, soil type, and depth to bedrock or water table. Additionally, leaching fields only remove certain wastes. If septic tanks are improperly placed, nitrates and VOCs can migrate to groundwater or surface water.

Water Supply

Lynnfield has difficulty meeting peak summer water supply demands despite water use bans that have been in place for the last few summers. Two additional deep bedrock wells are in the process of being added to Lynnfield's water supply system in the Wills Brook swamp area. Both of these wells will extract water from the Ipswich River watershed. Once the wells go on line, the degree of impact on the Ipswich River can be observed.

Lynnfield monitors its water supplies more frequently than is required by state or federal agencies. More than ten monitoring wells are located at and around a gas station that was the site of a petroleum spill. Since surface water drainage from the gas station passes close to the Phillips Road wellfield, the town has installed a 10,000 gallon-oil water separator chamber within the Main Street storm drainage system. The tank is equipped with a valve that can be closed to isolate and contain oil spills.

High Sodium levels (above 20 mg/l) were detected in water samples collected from 1987 to 1991. Lynnfield uses a 20:1 sand to salt ratio on the main roads near town wells. The salt is stored in a covered shed in a tank. A 10:1 ratio is used on the remainder of town roads.

Pillings Pond

The specific problems in Pillings Pond consist of algae blooms, duckweed intermixed with bluegreen algae, waterlilies and spatterdock covering a significant portion of the surface and contributing to the rapid accumulation of organic sediment and concerns about bacteria and odors. A 1978 study of Pillings Pond prepared by Carr Research Laboratory of Wellesley concluded that the Pond's eutrophication problems were caused by nitrogen limitations. Nitrogen control efforts such as stormwater management, fertilizer control, leaf control, street cleaning and Title V upgrades, must be incorporated in all proposed pond management programs.

Landfills

A closed landfill, formerly only used by the Lynnfield Public Works Department, is located west of Chestnut Street within the Zone III of the Trog Hawley wells. The landfill is unlined and does not have a leachate collection system. The landfill was only used by the Lynnfield DPW, so it was restricted to use for the disposal of leaves, stumps, trees and gravel. It is uncertain, however, whether the site was also occasionally used for some burned construction wastes generated from town construction projects. No household or commercial wastes were disposed at this site.

Methodology

The environmental problem narrative information was obtained from several studies (see Resources) and interviews (see Contacts).

Resources

Camp Dresser and McGee (CDM). 1992. Saugus River Flood Control Improvements: A Report to the Saugus River Watershed Committee.

Lynnfield and Wakefield, Massachusetts Conservation Commissions. March 1994. ACEC Nomination Proposal for Lynnfield Marsh (Reedy Meadow).

Metropolitan Area Planning Council. 1992. North Suburban Water Supply Protection Plan.

Contacts

Kenny Burnham, Lynnfield Water Department: (617) 334-3901

Alan Dresios, Lynnfield Planning Board: (617) 334-5552

Joe Maney, Town Administrator: (617) 334-3180

Section IV-D Conservation and Recreation Lands Narrative



Conservation Areas

Beaverdam Brook Conservation Area

This conservation area consists of over 57 acres of Conservation Commission land and 137 acres of Lynnfield Center Water District land. It has access points at the Colonial Shopping Center, Grayland Road and Trog Hawley. This area, which contains Beaverdam Brook, forms much of the watershed and recharge area for the Lynnfield Center Water District wellfields. The protection of these wetlands is essential. Acquisition of additional land, principally along the southern and western boundaries of the present Conservation Land, is an objective. Beaverdam Brook was one of three major conservation areas recommended for acquisition in Lynnfield's Master Plan of 1953.

Bow Ridge Conservation Area

This conservation area, also known as Kallenburg Quarry, is a substantial open space in the southern part of Lynnfield with an access point at Ledge Road. The view from the top of the ledge formations is spectacular, revealing the entire Boston skyline. Bow Ridge contains the highest point of land in Lynnfield, and takes its name from a rocky promontory that resembles the shape of an archer's bow. Acquisition of conservation land at Bow Ridge was recommended in the 1953 Master Plan.

Essex West Green Belt

This area of 9.78 acres was the first parcel of land to be deeded to the Town of Lynnfield under greenbelt zoning. The land is accessible from Jordan Road.

Reedy Meadow

Conservation Commission parcels, along with those owned by the Massachusetts Audubon Society and two Lynnfield golf courses, form most of the Lynnfield portion (approximately 405 acres) of the 540-acre Reedy Meadow (also known as Lynnfield Marsh). This has been designated as a National Natural Landmark by the U.S. Department of the Interior. It is the major water retention area for the Saugus River Watershed and provides significant wildlife habitat. Pillings Pond and Beaverdam Brook both drain into Reedy Meadow. The conservation land was recommended for acquisition in the 1953 Master Plan.

Partridge Island in Reedy Meadow

Partridge Island has access from Main Street across from Heritage Lane. This entrance, which follows a spring runoff brook, leads to Reedy Meadow and Partridge Island. A low level bridge walk was built across a short distance of the Meadow to the Island where an observation platform provides an excellent view of the Meadow. Native American artifacts have been found on Partridge Island, which was most likely the site of a Native American camp.

Bennett Keenan Conservation Area (Ipswich River area)

The Bennett Keenan Conservation Area consists of 25 Conservation Commission acres that border on the Ipswich River, the Town of Reading and land owned by the Lynnfield Center Water District. Access is from Elm Street in North Reading.

Pine Hill Lot

Pine Hill Lot consists of 9.5 acres of woodland surrounded by residential land. Access to this area is from Littledale Road and Mirabeau Lane.

Recreation Lands

Lynnfield's recreation lands include athletic fields at the five schools, Glen Meadow Park, Freeman Park, Town Common, Jordan Park, Newhall Memorial Park and three privately-owned golf courses.

Conservation Commission

Land in Lynnfield that is owned by the Conservation Commission totals 332 acres. It includes portions of the Beaverdam Brook Conservation Area, the Bow Ridge Conservation Area, Reedy Meadow and Pine Hill Lot.

Lynnfield Center Water District

Lynnfield Center Water District Land totals 655 acres. Parcels in the central portion of town include part of the Beaverdam Brook Conservation Area. In the north, Water District land surrounds the Bennett Keenan Conservation Area. Access to the Ipswich River and portions of trails in the Beaverdam Brook Conservation Area occupy Lynnfield Center Water District land.

Resources

Downe and Wells Associates. 1985. Town of Lynnfield Conservation and Recreation Map. (With subsequent changes noted by Betty Adelson).

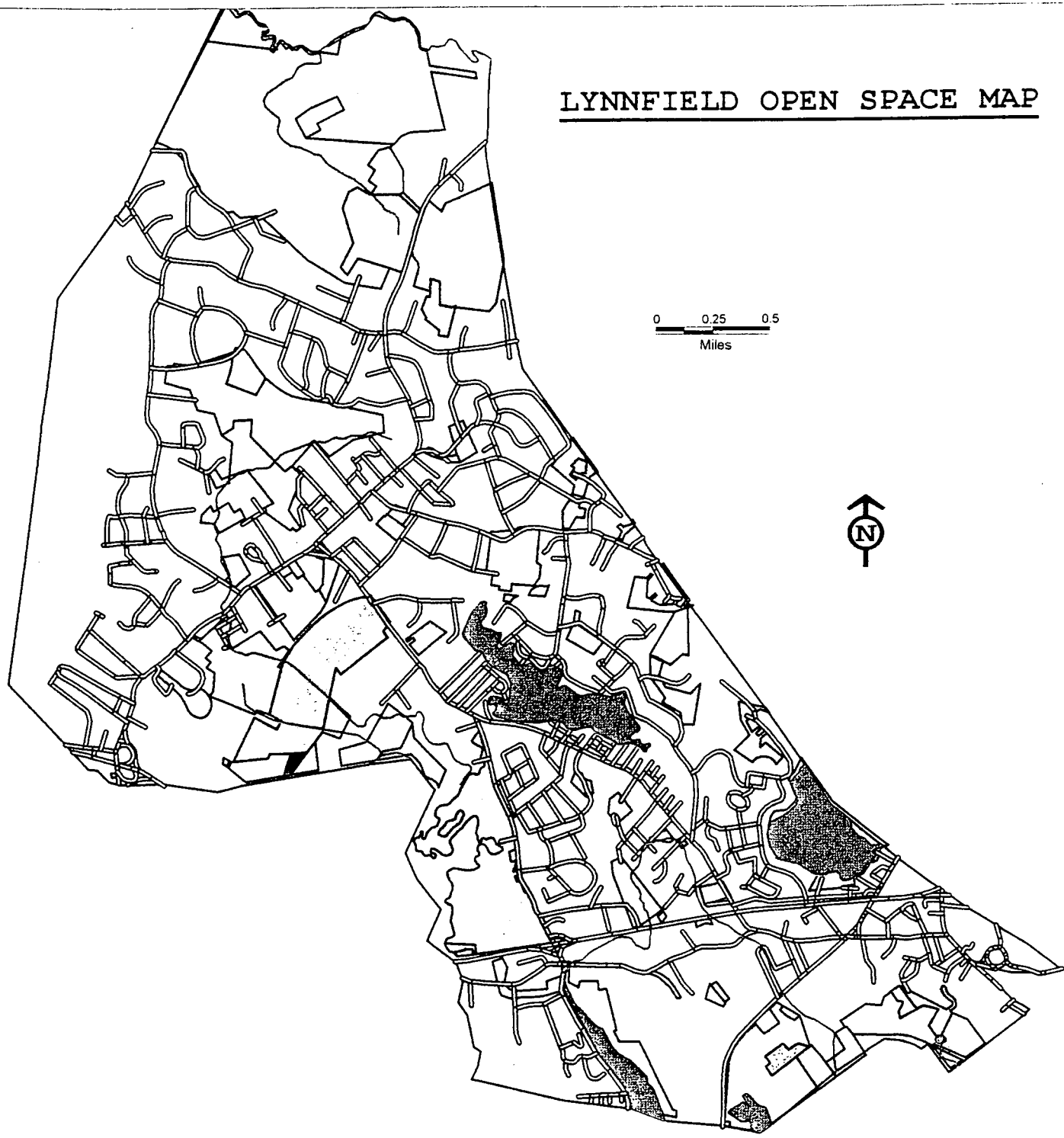
Wiswall, Marcia Wilson, ed. 1977. Lynnfield: A Heritage Preserved 1895-1976. Canaan, New Hampshire: Phoenix Publishing.

Inventory of Lands of Conservation and Recreation Interest									
Map	Lot	Acreage	Location	Owner	Managing Agency or Co-Owner	Zoning	Current Use	Location Detail	Condition
Agricultural Preservation Restriction (APR)									
None									
61A - Agriculture/Horticulture									
None									
61 - Forestry									
8	1325	18.90	REAR MAIN ST	RICHARDSONS FARM INC		RD			
61B - Recreation Private									
12	466	61.75	MAIN ST	SAGAMORE SPRING R E TR	LUFF LUFF & THOMPSON TRS	RD	Sagamore Spring Golf		
13	855	105.36	MAIN ST	SAGAMORE SPRING R E TR	LUFF LUFF & THOMPSON TRS	RD	Sagamore Spring Golf		
29	2414	97.51	SUMMER ST	COX REALTY TRUST	ROBERT W COX & ROBERT C BAKER T	FB	Lynnfield Center Golf		
Unprotected:									
Schools									
28	1455	32.70	MAIN ST	LYNNFIELD TOWN OF	MIDDLE SCHOOL	RA	School		
28	0746	0.83	MAIN ST	LYNNFIELD TOWN OF	SCHOOL DEPT	RA	Appropriated by JHS		
29	2763	9.39	SUMMER ST	LYNNFIELD TOWN OF	SUMMER ST SCHOOL	RB	School		
30	0333	27.36	ESSEX ST	LYNNFIELD TOWN OF	LYNNFIELD HIGH SCHOOL	RB	School		
42	2235	11.12	KNOLL RD	LYNNFIELD TOWN OF	HUCKLEBERRY HILL SCHOOL	RA	School		
Religious Institutions									
11	1513	2.84	LOWELL ST	MESSIAH LUTHERAN CHURCH	MESSIAH SYNOD	RD	Church		
24	2315	0.64	SUMMER ST	CENTER CONGREGATIONAL CHURCH		RA	Church		
25	2129	2.49	ESSEX ST	CORP PRESIDING BISHOP CHURCH	G C LATTER DAY SAINTS	RC	Church		
28	0162	9.96	CHESTNUT ST	ROMAN CATHOLIC CHURCH	ARCHBISHOP OF BOSTON	RB	Church		
28	0263	0.23	CHESTNUT ST	ROMAN CATHOLIC ARCHBISHOP	ARCHBISHOP OF BOSTON	RB	Church		
29	1059	1.21	SUMMER ST	ST PAULS EPISCOPAL CHURCH		RA	Church		
34	0444	10.05	SUMMER ST	TRINITY BAPTIST CHURCH		RB	Church		
52	0467	3.03	GROVE ST	CALVARY TEMPLE ASSEMBLY OF GOD		RA	Church		
52	1132	0.99	GROVE ST	ROMAN CATHOLIC ARCHBISHOP	ARCHBISHOP OF BOSTON	RA	Church		
52	1155	1.14	SALEM & GROVE	ROMAN CATHOLIC ARCHBISHOP	LADY ASSUMPTION CHURCH	RA	Church		
52	1111	1.65	GROVE ST	ROMAN CATHOLIC ARCHBISHOP	SCHOOL & CONVENT	RA	School & Convent		
52	1733	0.78	SALEM ST	LYNNFIELD COMMUNITY	CONGREGATIONAL CHURCH	RA	Church		
52	1842	0.18	BROADWAY	LYNNFIELD COMMUNITY	CONGREGATIONAL	RA	Church		
Significant Private Holdings									
60	0013	79.60	REAR BROADWAY	NEW ENGLAND POWER COMPANY	C/O DAVID M COLLINS				
60	0006	40.63	REAR MAIN ST	NEW ENGLAND POWER COMPANY	C/O DAVID M COLLINS				
39	0941	33.32	MAIN ST	LYNNFIELD INV TR LINNELL-SMITH TRS	% KING & MACNAMARA	RB			
60	0004	24.99	(COMBINED PCLS MASS ELEC)	MASS ELECTRIC CO	C/O PROPERTY TAX DEPT				
5	1584	24.87	REAR MAIN ST	RICHARDSONS FARM INC		RD			
34	2496	24.87	REAR TODD LN	WALSH MARY ALICE & DAVID H		RB		Reedy Meadow	
34	1756	19.90	ELIZABETH WAY	MEADOWVIEW RLTY TRUST	GERARD E WELSH TRUSTEE	RB/FP			
34	2885	19.15	SUMMER ST	ZYNSKY JOHN	EVELYN ZYNSKY	RB		Reedy Meadow	
33	2235	16.52	MAIN ST	BADGER WALTER H	MURIEL F BADGER	RB/FP			
Protected:									
Protected Public --									
Conservation Commission									
1	1864	5.47	REAR LOWELL ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Bennett Keenan	Wooded
1	2595	15.22	LOWELL ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Bennett Keenan	Wooded
1	2773	3.48	LOWELL ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Bennett Keenan	Wooded
4	2399	36.81	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				

Map	Lot	Acreage	Location	Owner	Managing Agency or Co-Owner	Zoning	Current Use	Location Detail	Condition
4	2771	6.96	REAR MAIN ST BMRR SOUTH	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
4	2799	5.97	REAR MAIN ST BMRR SOUTH	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
8	1279	11.94	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
19	1829	1.24	REAR TROG HAWLEY	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
19	1957	16.17	REAR TROG HAWLEY	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
19	2799	3.10	CARTER RD & WILLAR RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
21	1555	9.43	LITTLE DALE RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Pine Hill Lot	Wooded
23	0446	1.88	REAR TROG HAWLEY	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
23	0655	10.39	MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
23	0786	8.56	REAR CARTER RD & MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
23	1822	8.26	GRAYLAND RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
23	2113	7.32	MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Beaverdam Brook	Wooded
28	0498	0.60	CHESTNUT ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
28	0515	5.69	CHESTNUT ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
28	2698	4.38	MEADOW LN	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
30	1095	0.44	REAR BOURQUE RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
30	1257	1.29	REAR BOURQUE RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				Wooded
31	0891	6.17	REAR ESSEX ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
31	0992	9.73	REAR ESSEX - JORDAN	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Essex West Greenbelt	Wooded
31	1759	0.56	REAR LANTERN LN	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
31	2571	12.44	REAR MAGNOLIA DR	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
33	0575	39.50	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Partridge Island	
33	1869	2.69	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Partridge Island	
33	2026	7.44	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
34	2684	12.87	REAR SUMMER ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION		Railroad easement		
34	2785	7.96	REEDY MEADOW	LYNNFIELD TOWN OF	CONSERVATION COMMISSION		M&B Railroad		Wooded
36	0567	11.98	BROAD MEADOWS	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
36	0692	0.45	REAR MAGNOLIA DR	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
39	1095	1.16	REAR MAIN ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
42	1841	0.34	GREENWOOD RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
42	1886	0.47	ASHWOOD RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
42	2526	0.36	CEDARWOOD RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
46	0397	1.99	BROOK TIMBERHILL	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
47	1617	0.37	LOCKSLEY RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
51	0383	1.24	SUMMER ST	LYNNFIELD TOWN OF	CONSERVATION COMMISSION		Outlet to Suntaug Lake		Wooded
56	1385	14.76	LEDGE RD	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Bow Ridge	Wooded
56	2576	4.48	REAR BROADWAY	LYNNFIELD TOWN OF	CONSERVATION COMMISSION			Bow Ridge	Wooded
57	1648	30.05	REAR BROADWAY	LYNNFIELD TOWN OF	CONSERVATION COMMISSION				
Water District									
2	2555	35.82	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	0316	3.38	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	0378	9.97	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	0441	2.98	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	1072	12.84	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	1253	23.78	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	1817	11.54	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	1946	10.65	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	2135	49.75	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
3	2885	5.47	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	0247	1.19	LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	0498	4.26	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	0647	7.96	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	1091	19.90	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	1893	12.44	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
4	2055	29.85	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		






Map	Lot	Acreage	Location	Owner	Managing Agency or Co-Owner	Zoning	Current Use	Location Detail	Condition
4	2577	9.95	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	0229	29.65	CHESTNUT ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	0474	11.94	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	0562	5.97	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	1155	4.48	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	1433	0.75	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	1733	5.97	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	1887	1.49	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	2024	68.65	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	2539	2.59	REAR LOWELL ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
7	2866	17.99	MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	0487	15.42	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	0845	3.98	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	0914	2.74	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1045	4.48	MIDDLETON HILL	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1535	9.95	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1599	11.64	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1727	1.99	MIDDLETON HILL	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1822	1.99	MIDDLETON HILL	LYNNFIELD CENTER WATER DISTRICT			Water district		
8	1842	1.99	MIDDLETON HILL	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	0197	29.85	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	0992	6.47	REAR NORRIS RD	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	1771	3.98	REAR MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	1864	1.49	MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	1887	7.44	MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
12	2642	2.24	MAIN ST	LYNNFIELD CENTER WATER DISTRICT			Water district		
15	2319	1.24	CHESTNUT ST	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
15	2373	3.02	CHESTNUT ST	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
15	2461	12.83	TOPHET HILL-LOT 39	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
15	2655	19.90	WEST APPLE HILL LN	LYNNFIELD CENTER WATER DISTRICT			Water district	Cedar Swamp	
19	0581	44.50	REAR CARTER RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
19	1151	4.73	CHESTNUT & TOWNSEND RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
19	1218	2.94	REAR TOWNSEND RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	0718	0.99	WING RD	LYNNFIELD CENTER WATER DISTRICT			Water district		
20	0889	23.88	REAR PHILLIPS RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	0969	5.54	REAR PINE HILL RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	1176	16.75	MITCHELL RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	1596	0.09	PHILLIPS RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	1666	2.09	PHILLIPS RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	1682	2.98	REAR PHILLIPS RD	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
20	2873	2.24	REAR IVANHOE DR	LYNNFIELD CENTER WATER DISTRICT			Water district	Beaverdam Brook	
41	2862	0.69	TRICKETT RD	LYNNFIELD TOWN OF			Water district		
42	2353	0.35	KNOLL RD	LYNNFIELD CENTER WATER DISTRICT			Water district		
52	1359	0.24	SALEM ST	LYNNFIELD WATER DISTRICT			Water district		
56	0469	3.02	REAR BROADWAY	LYNNFIELD WATER DISTRICT			Water district		
59	2068	0.13	BROADWAY	LYNNFIELD WATER DISTRICT	PUMPING STATION		Pumping Station		
Parks									
24	2265	1.21	MAIN ST	LYNNFIELD TOWN OF	HISTORICAL SOCIETY	RA	Town Common		
30	2875	6.75	PILLINGS POND RD	LYNNFIELD TOWN OF		RC	Jordan Park		Wooded
38	2022	0.69	MAIN ST	LYNNFIELD TOWN OF		RB	Freeman Park		
41	2065	5.72	TRICKETT RD	LYNNFIELD TOWN OF		RA	Glen Meadow Park		
47	0593	0.80	SUNTAUG LAKE	LYNNFIELD TOWN OF		RA	Humphrey's Island		Wooded
47	2522	3.11	OAK ST	LYNNFIELD TOWN OF		RA	Newhall Mem. Park		
60	0030	1.99	REEDY MEADOW	LYNNFIELD TOWN OF	CON COMM JURISDICTION		Reedy Meadow		

LYNNFIELD OPEN SPACE MAP



LYNNFIELD OPEN SPACE BY STATUS OF OWNERSHIP

SOURCE: MASSGIS OPEN SPACE AND RECREATION DATALAYER EDITED BY TUFTS OPEN SPACE PLAN TEAM

-  WATER/ STREAMS
-  INHOLDING
-  MUNICIPAL (LYNN OR LYNNFIELD)
-  PRIVATE NON-PROFIT
-  PRIVATE

Section V-A Zoning and Bylaw Summary

This section can be used to supplement the build-out which will be performed by Lynnfield for the Growth and Development portion of Community Setting Section. In addition, it contains important information that was essential in formulating sound recommendations (see Recommendations section). Portions of the following are also included in the Reedy Meadow section, which is intended to inform Lynnfield, but not be included directly in their Open Space and Recreation Plan.

In addition to its eleven non-overlay zoning categories, the Town of Lynnfield also has greenbelt zoning, a floodplain overlay district, a groundwater protection district, a wetland buffer zone district, a Conservation Commission bylaw, a Board of Health septic bylaw and a large holding of land by the Water District which is regulated by state and town water district laws.

Lynnfield has eleven zoning categories not including the overlay districts. The smallest lots permitted are slightly larger than 1/3 of an acre. Most of town is zoned for 3/4 acre lots, with areas in the groundwater protection district requiring 1.5 acre lots. There are small industrial, business and commercial areas in the southeastern and western sections of the town.

Lynnfield's greenbelt zoning bylaw allows developers limited flexibility regarding lot proportions for subdivisions in single residence districts over 25 acres. The bylaw also gives specific requirements for configuring the number of lots permissible for the subdivision according to which zoning district the lots fall within. In exchange for flexibility in lot size, the developer must put aside no less than 20 percent of the subdivision for greenbelt land. The greenbelt land must be owned by a trust, subjected to a permanent conservation restriction and controlled

by the owners of the individual lots in the subdivision. Land within the floodplain district cannot be included as greenbelt land. The land use must be harmonious with the natural features of the tract.

The purpose of Lynnfield's floodplain zoning district is to ensure that lands in the Town of Lynnfield subject to seasonal or periodic flooding shall not be used for residence or other purposes. The only permitted uses of the floodplain are municipal recreation, public water supply or agriculture.

Lynnfield's groundwater protection district, designed to preserve Lynnfield's existing and potential sources of drinking water supplies and to conserve the town's natural resources, superimposes underlying zoning districts. The district lines were most recently updated in August, 1996. Activities permitted within this overlay district include outdoor recreation, maintenance and repair of existing structures (except those subject to prohibited uses), agriculture, forestry, repair and construction of drinking water supply related facilities and underground storage tanks related to these facilities. Many activities are prohibited within this overlay district including landfills and storage of all hazardous materials including septage not in compliance with 310 CMR 32.05 (Title V). Title V systems that receive more than 110 gallons of sewage per quarter acre per day, or 440 gallons on one acre, are prohibited. Any use that will render a lot to have greater than 15 percent impervious coverage will require a special permit.

Lynnfield's wetland bylaw is administered as a zoning bylaw through the Zoning Board of Appeals and not through the town's Conservation Commission. The Wetland Buffer Zone District includes the 100-foot buffer zone as defined by the Massachusetts Wetlands Protection Act. Within a 50-foot buffer zone, the only activities that are permitted are municipal recreation, public or private water supply, golf courses, agriculture and dwellings lawfully existing prior to the adoption of this bylaw. This bylaw offers, if exercised as described, more protection than the

Massachusetts Wetlands Protection Act which only offers jurisdiction in the 100-foot buffer zone and does not prohibit any activities. The law is not clear on the status of residential landscaping. The replacement of shrubs and trees with residential lawns can increase stormwater runoff and nonpoint source pollution, as well eliminate habitat that is vital for amphibians. Twice in the late 1980s and earlier, the Lynnfield Conservation Commission attempted to establish a wetlands bylaw at Town Meeting. Both attempts failed.

Lynnfield has a Conservation Commission bylaw, however, it regulates administrative activities and not land use activities. The bylaw gives the Commission the authority to impose a consultant and design review fee on applicants, to continue notices of intent, and requires 300-foot wetland abutter notification (the Wetlands Protection Act only requires 100 foot).

Lynnfield's Board of Health "septic" bylaw requires septic systems to be placed a minimum of 125 feet away from wetlands (Title 5 requires 100 ft). Enforcement of this bylaw depends upon the health inspector.

Lynnfield Center Water District has a water restriction bylaw, the purpose of which is to protect, preserve and maintain the public health, safety and welfare whenever a state of water supply emergency is in force. This bylaw provides for enforcement of any duly imposed restrictions, requirements, provisions or conditions intended to abate the emergency.

Resources

Hall, G. and A. Kreiger. 1996. Local Wetlands Bylaws and Hearings. Cambridge: Anderson and Kreiger.

Terrene Institute and U.S. Environmental Protection Agency (Region V Water Division). 1995. Local Ordinances: A User's Guide. Washington, DC.

Section V-B Reedy Meadow : After The ACEC Proposal

As discussed in other sections, Reedy Meadow is an important ecological system which serves as habitat for several state-listed rare wildlife species, a flood basin and a water resource for the City of Lynn. The National Park Service has monitored Reedy Meadow and found that the entire ecosystem is being threatened. It is one of two threatened National Natural Landmarks in Massachusetts. In 1994, the Conservation Commissions of Wakefield and Lynnfield submitted a joint proposal nominating the Meadow for Area of Critical Environmental Concern (ACEC) designation. The nomination included a 45-page narrative, letters of approval from Senator Edward Kennedy, Senator John Kerry, Congressman Peter Torkildson, state representatives and senators, the Saugus River Watershed Council and the Riverways Program, along with many maps, charts and photographs. The proposal, however, was declined.

A letter from Trudy Coxe, Secretary of Environmental Affairs, recommended that the applicants resolve the current environmental and regulatory problems associated with proposed dredging and implement a management plan for the Meadow. Secretary Coxe recommended that the management plan include local wetlands bylaws, wetlands restoration and banking, water supply district zoning, flood control zoning, land acquisition and public education. Lynnfield has already adopted some of these tools, but had not mentioned them in the ACEC proposal. The remaining tools should be considered before applying for Area of Critical Environmental Concern designation again. The following presents the management tools Lynnfield already has in place, and offers suggestions for the others that were recommended by Secretary Coxe.

In order to ensure that Reedy Meadow will continue to serve in its present capacity as a floodwater retention area, a wildlife habitat and a pollution prevention buffer to the City of Lynn's water supply, a variety of land management tools must be employed by both Lynnfield and Wakefield. Land management tools are necessary to control erosion and resulting sedimentation from a variety of land disturbing activities, reduce nonpoint source pollution (especially from the two abutting golf courses), control leakage from outdated septic systems and ensure the long term survival of diverse and rare habitats. Additional efforts can also be made to restrict inappropriate land use (for example, large impervious surfaces or large areas without adequate vegetation) and coordinate land purchase efforts between the two communities, and between public and private non-profit entities. Additionally, the Conservation Commissions of both towns should continue to administer and enforce the Wetlands Protection Act to its full extent. Conservation Commissions can also strengthen their authority with wetlands bylaws and assistance from other state wetlands programs.

Existing Management Tools

Lynnfield has already employed several land management tools that are presently assisting in the Meadow's protection. The Meadow is within a floodplain zoning district. This district ensures that lands in the Town of Lynnfield subject to seasonal or periodic flooding shall not be used for residential or other purposes. The only permitted uses of the floodplain are municipal recreation, public water supply or agriculture. The boundaries of the floodplain district, however, closely follow the boundaries of the physical wetland and do not offer any authority over upland activities outside the floodplain district.

Lynnfield's zoning laws include a groundwater protection overlay. While this district does not physically encompass Reedy Meadow, it does include the

Beaverdam Brook and Cedar Swamp area that feeds directly into the Meadow. The groundwater protection district, designed to preserve Lynnfield's existing and potential sources of drinking water supplies and conserve the town's natural resources, superimposes the underlying zoning districts. The district lines were most recently updated in August of 1996. Activities permitted within this overlay district include outdoor recreation, maintenance and repair of existing structures (except those subject to prohibited uses), agriculture, forestry, repair and construction of drinking water supply related facilities and underground storage tanks related to these facilities. Many activities are prohibited within this overlay district including landfills and storage of all hazardous materials including septage not in compliance with 310 CMR 32.05 (Title V). Title V septic systems that receive more than 110 gallons of sewage per quarter acre per day, or 440 gallons on one acre, are prohibited. Any use that renders a lot to have greater than 15 percent impervious coverage requires a special permit. The continual administration and enforcement of this overlay district should serve to protect some of the water entering Reedy Meadow from increased nonpoint source pollution, stormwater runoff and upstream contaminants.

Lynnfield's wetlands bylaw is administered as a zoning bylaw through the Zoning Board of Appeals and not through the town's Conservation Commission. The wetland buffer zone district includes the 100-foot buffer zone as defined by the Massachusetts Wetlands Protection Act. Within a 50-foot buffer area, the only activities that are permitted are municipal recreation, public or private water supply, golf courses, agriculture and dwellings lawfully existing prior to the adoption of this bylaw. If exercised as described, this bylaw offers more protection than the Massachusetts Wetlands Protection Act which only offers jurisdiction in the 100-foot buffer zone and does not prohibit any activities. The law is not clear on the status of residential landscaping. The replacement of shrubs and trees with

residential lawns can increase stormwater runoff and nonpoint source pollution, as well as eliminate habitat that is vital for amphibians.

New Management Tools

Although Lynnfield has employed several zoning bylaws that serve to protect Reedy Meadow, additional measures can be taken. Additional nonregulatory management tools include public education, education of town boards, intercommunity cooperation and planning (Wakefield has no bylaws), watershed wetlands restoration planning, open space acquisition and floodplain management.

Education

The public, the town boards of Lynnfield and Wakefield, and the private property owners whose property surrounds the Meadow need to be aware of the ecological importance of Reedy Meadow. This awareness is critical to facilitate acceptance of any additional protective measures. This dual community effort could be spearheaded by the Saugus River Waterways Committee, the town selectmen, the Riverways office and the Lynnfield and Wakefield Conservation Commissions. Planning Boards, Zoning Boards of Appeals and Departments of Public Works members all need to be aware of the flood control, habitat and water purification functions the Meadow serves, and the impacts their actions have on these functions. It is important for these boards to consistently enforce existing regulations (Title V and the Wetlands Protection Act) in addition to employing new management tools. Presently, Lynnfield's septic bylaw requires a 125-foot setback from wetlands and waterways, but this is not consistently enforced. New septic systems meeting Title V regulations are gradually replacing leaking systems, but are only as good as the enforcement. If the new systems do not have the proper depth

to groundwater and setbacks from wetlands and waterways, the intended environmental protection will not occur.

Following the education of town officials, public education efforts should be pursued. More citizens will value the Meadow if they realize the important functions it serves. Public education could consist of slide shows, workshops, newsletters, speakers, displays and guidance manuals. In addition to serving as a means for establishing politically viable goals, education helps keep people involved. Educational efforts could also be coordinated with the Saugus River Watershed Committee and The Riverways Program. The Reedy Meadow ACEC proposal is an excellent document for use in both public and town official education. The narrative can be summarized for press releases and the maps can be enlarged for use in schools and libraries.

It is important for intercommunity cooperation, communication, and planning to occur between the two communities, Lynnfield and Wakefield, that share Reedy Meadow. The two communities need to develop an open forum in which to discuss cooperative land use protection and public education measures. Land use management tools employed by one town can be negated by harmful actions occurring in the other town. Presently, Wakefield does not have any environmental bylaws supplementing the Wetlands Protection Act. Additionally, Wakefield's industrial zone abuts the Meadow. Leaking septage and golf course runoff are problems on Lynnfield's side of the Meadow, while potential hazardous waste leakage and runoff from large impervious surfaces such as parking lots are problems on the Wakefield side.

Floodplain Management

Reedy Meadow is the dominant flood control feature in the Upper Saugus River watershed system. Reedy Meadow has a tremendous storage capacity and a

plays a vital role in attenuating flood flows and controlling downstream flow and flooding. Flood storage capacity, however, appears to have deteriorated significantly over the last few decades due to sedimentation and vegetative growth (cultural eutrophication) clogging the stream channels through the marsh.

The 1992 Camp Dresser and McGee Flooding Study offers practical, cost-effective measures to reduce the frequency and severity of flooding. However, the nearly flat, already built-up portions of this river system makes total elimination of flooding from large storms prohibitively expensive.

The B&M railroad culverts located in the Reedy Meadow area have been operating at greatly reduced flow capacity. This reduced capacity is due to clogging with debris and sediment. These culverts need to carry the flow from 7.5 square miles of drainage area that contribute to the portion of the Meadow above the railroad. All three culverts need to be kept clear, free-flowing and well maintained. Eventually, new culverts should be installed with increased capacity as an insurance against future clogging. This measure alone will not substantially reduce upstream flooding.

Other recommended flood control measures for this area include:

- Strict enforcement of erosion control measures to prevent further sedimentation of the culverts and stream channels;
- Enforcement of existing regulations such as the Wetlands Protection Act, Title V, floodplain zoning, and the conservancy district to prevent further floodplain encroachment and the resulting loss of floodplain storage capacity.

Wetlands Restoration

The Wakefield and Lynnfield Conservation Commissions should contact the Massachusetts Wetlands Restoration and Banking Program (WRBP) about

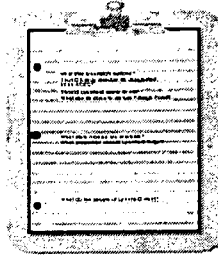
developing a Watershed Wetlands Restoration Plan for Reedy Meadow. The Meadow meets all of the program's criteria for a wetland that provides vital watershed functions, and would benefit from a restoration effort to revitalize its capacity to perform these functions. WRBP's GrowWetlands (Groups Restoring Our Wetlands) initiative provides a framework to develop restoration plans. The plan consists of maps illustrating existing wetlands and potential wetlands restoration sites, the wetlands restoration goals for the watershed, a restoration evaluation matrix, guidance on how to organize and manage the restoration project (including obtaining funding) and guidance on how to evaluate success. Wetlands Restoration and Banking works with town officials, private landowners and project sponsors to find funding and get restoration underway. Additionally, Wetlands Banking and Restoration has a small-grant program for hard to fund projects.

Through their Open Space and Recreation Planning processes, Lynnfield and Wakefield should be identifying vulnerable areas surrounding the Meadow for possible purchase. Open Space and Self-Help grants can provide up to \$500,000 per community towards the purchase of these parcels. Joint community projects and projects that protect water resources, rare and endangered species habitat, and connect other open space parcels often receive more funding. Once these recommendations have been considered, and hopefully adopted, the Lynnfield and Wakefield Conservation Commissions may consider proposing Reedy Meadow for a state Area of Critical Environmental Concern once again.

Resources

Camp Dresser and McGee (CDM). 1992. Saugus River Flood Control Improvements: A Report to the Saugus River Watershed Committee.

Section VI Recommendations



Lynnfield Historical Commission Facility

The town of Lynnfield would benefit from the establishment of a facility to house archival and historical documents. Currently historical information is kept at the homes of Historical Commission members. The proposed facility may be a free-standing building or part of an existing building.

Conservation Commission Wetlands Bylaw

The Lynnfield Conservation Commission has twice proposed the adoption of a wetlands bylaw at the annual town meeting and twice the measure has not passed. A third attempt could possibly bring success if extensive public education measures (see Reedy Meadow section) are undertaken, and additional help is enlisted from the Riverways Office which can provide assistance in passing bylaws, and the Massachusetts Association of Conservation Commissions (MACC).

A non-zoning wetlands bylaw would give Lynnfield's Conservation Commission more authority to regulate activities in and near wetlands and water bodies. Lynnfield presently has a wetlands zoning bylaw that is administered by the Zoning Board of Appeals. The town bylaws provide a 50-foot buffer zone in addition to the 100-foot jurisdictional zone provided by the Massachusetts Wetlands Protection Act. Within this area, the only activities that are permitted are

municipal recreation, public or private water supply, golf courses, agriculture and dwellings lawfully existing prior to the adoption of this bylaw.

A bylaw administered by the Conservation Commission, in addition to the Zoning Board of Appeals, need not be redundant. The bylaw would impose more protective measures than the state's Wetlands Protection Act (M.G.L. Chapter 131, section 40). Large amounts of private and municipally-owned land containing wetlands still exist in Lynnfield along Wills Brook, Beaverdam Brook, Pillings Pond, Hawkes Brook and the Saugus River (including Reedy Meadow). These areas should be protected from further degradation. The wetlands bylaw could include additional resource areas to be protected such as isolated wetlands and floodplains. It could also redefine protected areas to be more inclusive and could establish additional performance standards for certain types of resource areas or certain types of work. Additionally, a wetlands bylaw could assist in strengthening habitat preservation. The Massachusetts Wetlands Protection Act does not protect the habitat values of the buffer zone and, subsequently leaves species that depend on the wetland/upland edge vulnerable to habitat loss. A wetlands bylaw could prevent high impact uses of upland islands, as well as marsh and wetland edges.

Land Acquisition

Lynnfield should seek creative approaches to land acquisition and less than fee (non-ownership) conservation interests in collaboration with public, private and non-profit interest groups such as Essex County Greenbelt, Massachusetts Audubon Society, the Trust for Public Land and Trustees of the Reservations. Lynnfield presently has a greenbelt zoning bylaw which has been employed by half a dozen developers. However, no private non-profit land trust exists through which to educate and encourage land owners about the variety of conservation and tax options available.

Two defunct railroads cross Lynnfield's prime conservation and recreation land. The town should look into the possibility of receiving Rails to Trails grants for purchase of these easements from the Boston & Maine Railroad in order to enhance the town's trail system. The trails may serve to connect to adjacent communities with large conservation areas and trail systems, such as Reading and Middleton.

Septic Leakage

Lynnfield should continue to refine and enforce local regulations affecting septic systems. This could include a public education component on the benefits of the new state-approved alternative systems for land owners with poor soil, small lots or high groundwater. Additionally, the town should perform a long-range analysis of alternatives for septage disposal and a "sewer versus no sewer" study for the more densely populated areas of town, such as around Pillings Pond and the Town's center. Although the costs of sewerage large portions of Lynnfield have been discussed for years and ruled out as having prohibitive costs, some consideration should be given to tying the densely populated Pillings Pond area into the West Peabody sewerage system. Alternative systems should be required for lots on Pillings Pond that cannot meet the depth to groundwater or perc requirements. This is a requirement of the most recent Title V revisions, but it is essential that it is enforced.

Pond Protection

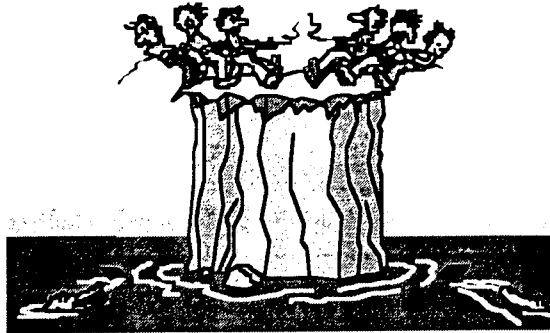
All ponds in Lynnfield are protected by the 50 foot no-disturb zone of the wetlands zoning bylaw. Some receive additional protection from either the floodplain zoning district or the groundwater protection district. Suntaug Lake and Hawkes Pond, however, do not receive this additional protection. Both of these

ponds may benefit from additional protection provided through surface water overlay districts, from the impacts of land uses occurring directly on their shores and further upland within their watershed.

Resources

Camp Dresser and McGee (CDM). 1992. Saugus River Flood Control Improvements: A Report to the Saugus River Watershed Committee.

Section VII Process and Experiences



The Lynnfield Open Space and Recreation Plan Field Project enabled our team to experience many levels of project definition and determination of scope, client negotiations, resource assessment, information gathering and compilation, data analysis and recommendation development. The process also posed various obstacles concerning client expectations, access to information, municipal politics, clarification of our team's role, and town perception of our team and its abilities. From this process, including how we chose to address the obstacles, we gained knowledge and skills that should prove to be valuable in the future.

We began the project by reviewing the state-defined checklist of required Open Space and Recreation Plan elements. Realizing that it would not be feasible, or desirable, for the team to complete the entire plan, we decided that we would attempt to define the parameters based on a combination of our interests and skills related to the various plan components, and the client's priorities. We eliminated the Community Goals, Analysis of Needs, Goals and Objectives, and Five Year Action Plan sections because Lynnfield had yet to distribute or analyze a community survey assessing the priorities of the residents regarding open space and recreation lands. In addition, the state intends for these sections to be completed by town residents. We also eliminated the Growth and Development portion of the Community Setting section, which is a build-out analysis involving a lengthy engineering-oriented process.

The next step was for several team members to attend an Open Space Committee meeting in Lynnfield. This enabled the team to meet the various players involved, assess the political dynamics at work (between Peter Caleshu and the team, between Peter and the Open Space sub-committee chairs, and between the team and the sub-committee chairs). On the day following the January 29th Open Space Committee meeting, the team met with Peter Caleshu to discuss project scope, expectations, and priorities. Peter identified his highest priorities as the mapping components, the Conservation and Recreation Lands Inventory, and the town survey. Despite our efforts to emphasize that our time deadline would make it impossible for us to perform the necessary data entry or analysis of the survey, Peter did not comprehend this limitation. He persisted in speaking as if we would be doing the survey. We realized that there were significant differences between the expectations of the team and those of Peter that needed to be addressed.

As a direct result of the initial client meeting, the team decided to draft a formal contract to define explicitly what the team was prepared to deliver (see Appendix B for copy of contract). We built into the contract a mid-point status review to enable us to reassess and make any necessary adjustments to the project scope. Our intention was to prevent the emergence of conflicts or confusion later on in the process. The contract was presented to Peter as a standard component of the Field Project experience, as opposed to an indication of any problem. He received the contract well and accepted its terms.

The team's next step was to assess Lynnfield's resources available for the creation of the Open Space Plan. In an effort to define the available resources for ourselves, we indexed all Conservation Commission maps (zoning, wetlands, tax assessor, etc.) and identified related reports (e.g., ACEC nomination for Reedy Meadow). In addition, we investigated the Lynnfield Public Library and determined that, except for several books on the history of Lynnfield, its resources were rather

limited for our purposes. Throughout the project, Betty Adelson, Conservation Commission Administrator, provided us with numerous documents and reports, facilitated our contacts within the town, and served as an invaluable source of knowledge and information.

In an effort to determine the condition of unidentified town-owned lands, various team members spent time "redlining" the tax maps. This involved driving around Lynnfield and identifying the nature of town-owned parcels (e.g., woodlot, water district, et cetera). This process was extremely beneficial for reasons beyond obtaining necessary data. Wandering around enabled us to develop a good sense of the town's layout and its general characteristics. The housing development we discovered around Pillings Pond alerted us to the possibility of septic problems and the controversy surrounding the dredging of the Pond. We came across several instances of illegal dumping and tree cutting taking place on town-owned land, specifically in water districts, which are serious problems directly relevant to the protection and viability of open space, and to public health and welfare. In addition, we were able to see what, according to the maps, was designated as open space.

As we worked on the various Open Space and Recreation Plan components, we came up against what might be described as "territorial" or "turf" issues with some sub-committee chairs and with a Tax Assessor's Office staff member. Early in the process, Beth Brazil, the chair of the Environmental Inventories sub-committee, expressed some concern about the extent of our involvement in her section. She had been planning that we would only do the maps, while she would write the text. The team set up a meeting with her during which we emphasized that she would have complete control to use the products we created in any way she wished (e.g., word-for-word, rewrite in her own voice, use only certain sections, et cetera), thus clarifying for her what our role was in the process. Once she understood this, she became extremely cooperative and supportive. In conjunction with Beth, we

decided that she would be solely responsible for the Fisheries portion of the Fisheries and Wildlife section, as well as for the Hazardous Waste Sites and Landfills portions of the Environmental Problems section. In a contrasting experience, the Community Setting sub-committee seemed perfectly content, and appreciative, to have us do whatever work on their section we wished or were able to complete. They were quite helpful in providing us with information and suggestions.

The maps created for the Open Space and Recreation Plan must be reproducible, because the state needs several copies of the Plan and the town will need to use the maps in various reports and for later updates. Each community must decide whether to use computerized (such as GIS) maps or traditional hand-drawn maps using the USGS map as a base. There are numerous benefits to using computerized maps: 1. once data are entered into the system, maps can be printed out at many scales; 2. the maps have a professional appearance; and 3. the maps are easy to overlay and reproduce. These maps, however, can be quite expensive (roughly \$60 a map), costing more than most communities are able to spend.

The dilemma facing the team and the town of Lynnfield was that computerized maps would be vastly preferable, given the above described advantages and the time that would be saved by not having to draw maps by hand, but would involve prohibitive costs. Peter Caleshu gave us the name and telephone number of Tom O'Leary in the Essex County Planning Office as a potential source of computerized GIS maps. We approached this office to determine whether they had specific Lynnfield data in their GIS system. We explained our needs to Chris Russell, the Regional Planner in the Essex County Planning Office, and set up an appointment with him. He confirmed that they did indeed have Lynnfield in their system and, to our surprise, explained that he was in the process of developing a workshop and was looking for a sample community with which to

demonstrate how GIS can be used to analyze environmental problems and open space needs. He agreed to generate the GIS maps we needed, with the exception of the Soils map (because that data set had not been digitized), in exchange for the supplemental Lynnfield data needed to complete the maps and an analysis for use in his workshop.

Our next step was to approach Lynnfield to obtain approval for what we perceived to be a mutually beneficial arrangement. We discovered, however, that Lynnfield's Conservation Commission had previously turned down the Essex County Planner's offer of inexpensive GIS maps. This may have been partly due to the tension that exists between municipal and county government in the state of Massachusetts. In addition to town approval, we also needed an electronic (disk) copy of the tax assessor's database, which contained information essential to the production of the GIS maps.

We submitted a written request for permission to Peter Caleshu in which we explained the maps that would be produced, how they would be used in the county workshop, how beneficial they would be to the town in its open space planning process, and that time was of the essence in obtaining the database disk. Peter quickly gave us his approval to proceed. We then approached the Tax Assessor's Office agent to request the disk. She said she did not know how to put the data on disk, and questioned why we needed it. She stated that we would need permission from the Tax Assessment Board. She further informed us that if we were to receive permission to access the electronic data file, obtaining it would require the hiring of a computer consultant for many hours at \$60 an hour. When we explained this to the Essex County Planner, Chris Russell, he informed us that it should actually be a simple downloading procedure.

Peter Caleshu drafted a letter explaining to the Tax Assessor's Board why we needed the database and asking their permission to grant us access. The Board met,

and the next day we were told that the disk was available. We called Chris Russell to inform him of the good news and made plans to obtain the disk. When Lisa called to arrange to pick up the disk, she learned there was no disk. The Tax Assessors Board apparently had not granted permission because there was not enough information. We would have to wait until their next meeting.

Eventually, more than five weeks later, we received word that a computer consultant would be hired to create our disk. A week later, we received the disk and brought it immediately to the Essex County Planning Office. When Chris Russell converted and opened it, he discovered that it only had two fields -- the property owner and the assessed property value. We also needed lot size, zoning, and municipal codes. We had to return to Lynnfield to report the bad news. We were fortunate, however, in that the consultant had made a disk for another board containing all of the fields. We received this the following day.

Despite our efforts, through the formal contract and repeated conversations, to define the survey as outside the parameters of our project, Peter and Margie Silvern, Chair of Conservation Commission and the Open Space Committee member in charge of the survey, continued to pursue the issue. While they were obviously extremely interested in having our assistance in working with the survey results, paradoxically, they were not as receptive to our suggestions concerning the content and structure of the survey itself. We felt that it did not address the full range of issues related to Open Space planning, such as aesthetics and environmental concerns, growth issues, and water supply issues.

In the hopes that our team would thus be available to conduct analyses, despite our assertions to the contrary, they pushed up the planned mailing date of the survey. Approximately 4500 surveys were mailed in early February, with provisions for several drop-off return locations throughout the town. Once completed surveys began to come in (as of March 26th, 1247 had been returned), the

issue of team participation in data entry was raised again. We emphasized that time constraints and other Open Space Plan responsibilities would prevent us from devoting extensive energy to that effort. In an effort to compromise, we offered our assistance in setting up a computer spreadsheet in which to record the survey responses and calculate basic statistical information, and in training Peter in its use.

There seemed to be some lack of communication between Peter and the Open Space Committee prior to our arrival on the scene. Members of the Committee did not appear to be clearly informed as to the purpose of our involvement or our roles in the preparation of the Plan. There emerged an interesting dichotomy of perceptions. On the one hand, we were perceived as technical "experts" in statistical analysis, despite our protests to the contrary. Simultaneously, there were expectations that we would be doing "grunt work" such as data entry and we were frequently referred to as "girls." We discovered that it can be useful to play the "student" card, as when we were attempting to gain access to the tax database. At other times, however, it can lead to an underestimation of our abilities (as in "they're just students").

This Field Project could be characterized as more time and labor intensive than financial. This is partly due to the nature of the project's activities, but also to our creative abilities to obtain "more for the money." This is exemplified by our success in obtaining essentially free GIS maps from the County Planners Office, in exchange for data and analysis.

Our educational experiences, in the form of knowledge and skills, were varied and numerous. It was a divergence from straight research, involving a lot of interaction with people at various governmental levels. We experienced hands-on learning in the art of negotiation, with regard to both the contract and the community survey. We learned well the lesson that it is sometimes necessary and appropriate to hold firm to an agreement, to avoid greater conflict later. Even in

negotiations, certain things must be placed "off limits," or one risks being taken advantage of.

In addition to the value of holding the line, we also learned the importance of creative compromise. In agreeing to take on the Conservation and Recreation Lands Inventory and the mapping requirements, we avoided the potential quagmire of working on the survey. This accommodated the majority of the client's priorities, while at the same time allowing us to work on tasks that offered us the greatest potential for substantive learning.

Through our experience with obtaining the GIS maps from the Essex County Planner's Office, we learned that perseverance and tenacity often pays off. Remaining diplomatic throughout this process, we did not give up or take the first "no" from the Lynnfield Tax Assessors Office as a final answer. This experience also taught us the importance of information "gatekeepers" to the success of a project. In this particular case we had to deal with a gatekeeper (for example, the staff member in the Tax Assessor's Office) who seemed intent on blocking our access to information. This caused many delays, frustrations, and wasted time and energy. At other points in the project, however, we worked with gatekeepers, such as Betty Adelson and Carol Cashman, who were extremely helpful and supportive.

This project provided us with exposure to the wide range of resources (mapping services, grant programs, et cetera) that the state of Massachusetts has to offer towns and individuals. The state appears to have extended itself in an effort to be helpful to towns during their open space planning, and has made a great deal of funding available for the open space protection projects that result. We learned of the existence of the Natural Heritage Program (within the Division of Fish and Wildlife) which provides municipalities with detailed information on the listed (endangered, threatened, special concern) plant or animal species known to inhabit the town. It was also informative to learn about the existence of the state's ACEC

program. This program has critical implications for land preservation in Massachusetts, with the potential to function as the core within larger efforts to protect entire ecosystems. It was helpful to be exposed to the limitations and misperceptions surrounding ACEC as well, as was exemplified by Lynnfield's experience with Reedy Meadow.

Several team members were able to attend the annual Massachusetts Association of Conservation Commissions (MACC) meeting at the invitation of Peter Caleshu and Betty Adelson. They participated in workshops including "Ways to Preserve Open Space," "ACECs: History, Procedure and Future," and "Wildlife Habitat: Current Assessment Methodologies."

Our experience in Lynnfield provided us with a crash course in the workings of small town politics. We realized the critical importance of understanding the various players and their interests and motivations. This is often difficult for outsiders to ascertain. Personal dynamics, however, appear to be essential elements in the functioning of local government. In addition, the fact that Conservation Commissions are composed of volunteers can have significant policy implications. Those responsible for the implementation and enforcement of regulations on the local level may not be technically knowledgeable or understand the ramifications of various local decisions. The variations among Conservation Commissions (member abilities and knowledge, philosophies, et cetera) can lead to inconsistent implementation of regulations across the state. These Commissions, however, also empower local communities to implement state regulations according to their own priorities and unique knowledge of local conditions.

We learned that Lynnfield is quite progressive in its pursuit of environmental protection, including groundwater protection, strict floodplain zoning, greenbelt zoning, and designation of wetland buffer zone districts. They have an impressive amount of land that is protected through Conservation

Commission ownership. They are hampered, however, by a lack of communication between the various boards (Conservation Commission, Zoning Board, etc.).

Overall, our Field Project experience was a rewarding mix of opportunities and challenges, frustrations and pleasant surprises. We all gained knowledge and skills from the wide variety of activities in which we engaged, and the range of people with whom we interacted.

Appendix A
List of Maps
(arranged in the order in which they appear)

Map 1	Zoning Map
Optional Map 1	Historical Buildings in Lynnfield
Optional Map 2	Historical Sites in Lynnfield
Map 2A	Geology and Topography
Map 2B	Development Limited Soils
Map 2C	Scenic, Historical and Cultural Sites
Map 3A	Water Resources of Lynnfield
Map 3B	Drainage Sub-Basins of Lynnfield
Map 3C	Lynnfield Flood Map
Map 3D	Lynnfield Water Protection District
Optional Map 3	Estimated Habitats of Rare Wildlife
Map 4	Open Space and Recreation Areas

Appendix B

Contract of Terms for the Lynnfield Open Space Project Student Consultants

This contract is intended to define the tasks, conditions, and time constraints under which the Graduate Student Consultants of Tufts University Department of Urban and Environmental Policy, hereafter referred to as the UEP program, shall assist the Open Space Committee of Lynnfield Township. This assistance is provided as a service through the Field Project requirement of the UEP program. Faculty assistance is provided through Dr. Ann Rappaport and Dr. Christine Couseneau.

The following students are named as Graduate Student Consultants, hereafter referred to as the students, for the purposes of this contract: Laurie Archambeault, April Bowling, Kris Bronars, Tracey Miller, and Lisa Press.

Duties:

The following duties are the agreed upon tasks to be completed by the students to the best of their abilities by April 1, 1997. A midterm review of the students' performance of these tasks will be held at a suitable and agreed upon date.

Provide assistance to Beth Brazil, Chair of Environmental Inventory and Analysis Subcommittee, with the following inventories and maps (primary resource student in bold):

Geology, Soils, and Topography (map, description, community implications)

April Bowling, Tracey Miller

Landscape Characteristics (description, definition)

April Bowling, Laurie Archambeault

Water Resources (map, description)

Lisa Press, April Bowling

Vegetation (optional map, inventory, recreational uses)

Kris Bronars, **Tracey Miller**

Fisheries and Wildlife (optional map, inventory, protection suggestions)

Kris Bronars, **Tracey Miller** (minimal assistance to Beth Brazil)

Scenic Resources and Unique Environments (locate, map)

Laurie Archambeault, April Bowling, Kris Bronars, Tracey Miller, Lisa Press

Environmental Problems:

Lisa Press (minimal assistance to Beth Brazil)

Provide assistance to Barbara Drozek, Chair of Historical Context Subcommittee, with the following Open Space Plan components (primary resource student in bold):

History of Community (optional map, inventory, writing)

Laurie Archambeault, Kris Bronars

Population Characteristics (optional map, patterns of need)

Laurie Archambeault

Provide assistance to the Chair of Conservation and Recreation Inventory, with the following Open Space Plan components:

Inventory and Assemblage of data (cataloging, inventory)

All Students

Such assistance includes fieldwork, academic and general research, computer tasks, writing, editing, and map drawing. G.I.S. mapping contingent upon availability of funds from the Township of Lynnfield or other appropriate arrangements. Student consultants have access to a total budget of \$100.00 that is designated for transportation, phone calls, copying, and preparation of their final report. All assistance must be provided within the dates of January 16, 1997 and April 1, 1997, with final report handed in by May 1, 1997. See attached timeline for specific task timelines and deadlines. All additional requests for assistance will be channeled through Peter Caleshu, who is designated as the Client Contact, and will be accommodated only as time and pre-arranged projects allow, and must be agreed upon unanimously by the students, and incorporated into the contract. The students reserve the right, in agreement with the Client Contact, to narrow the project focus if the midterm review reveals the scope to be too broad to be adequately completed by the April 1, 1997 deadline. The mid-term review will be attended by the students and the Client Contact.

We the below undersigned, agree to abide by all terms stated by the above contract.

Peter Caleshu 2/4/97
Peter Caleshu Date
Client Contact

Laurie Archambeault 2/3/97
Laurie Archambeault Date
Student Consultant

April Bowling 2/3/97
April Bowling Date
Student Consultant

Kris A. Bronars 2/3/97
Kris Bronars Date
Student Consultant

Tracey Miller 2/4/97
Tracey Miller Date
Student Consultant

Lisa Press 2/3/97
Lisa Press Date
Student Consultant

Appendix C Log Of Meetings

<u>DATE:</u>	<u>PURPOSE/ATTENDEES:</u>
1/20/97	Initial Team Meeting (all team members)
1/23/97	Initial Meeting with Christine Cousineau, faculty resource person (all team members)
1/28/97	Team preparation for first meeting with Peter Caleshu, Chair of the Lynnfield Open Space Committee and Field Project Client (all team members)
1/29/97	Open Space Committee Meeting in Lynnfield (April, Laurie and Lisa)
1/30/97	Initial Meeting with Peter Caleshu to discuss Peter's priorities, the scope of the project and town resources available to the team (all team members)
1/31/97	Meeting to draft contract and project timeline (April, Kris, Lisa and Tracey)
2/4/97	Review and indexing of Lynnfield maps (April, Kris, Lisa and Tracey)
2/4/97	Meeting with Carol Cashman, Lynnfield Town Clerk (Laurie)
2/5/97	Meeting with Tom O'Leary and Chris Russell, Essex County Planning Office regarding GIS maps for Lynnfield (April and Lisa)
2/6/97	General Team Meeting (all team members)
2/7/97	Redlining of Open Space in Lynnfield (April, Kris and Tracey)
2/8/97	Redlining continued (April and Tracey)
2/11/97	Completion of Redlining (April, Kris and Tracey)
2/11/97	Meeting with Beth Brazil and Damon Frecker, members of the Open Space Committee, regarding Environmental Inventory Issues (April, Kris, Laurie and Tracey)

- 2/17/97 Meeting with Barbara Drozek, Sue McDonough and Jill Giugliano, members of the Lynnfield Historical Commission and Open Space Committee members (Laurie and Kris)
- 2/18/97 Vegetation and Wildlife Inventory Research and Planning (Kris and Tracey)
- 2/20/97 General Team Meeting (all team members)
- 2/21/97 Review of Lynnfield Library Resources (Kris and Tracey)
- 2/25/97 Meeting with Ann Rappaport, instructor of the Field Projects class, to discuss project issues (all team members)
- 2/26/97 Open Space Meeting (April and Laurie)
- 2/26/97 Meeting with Peter Caleshu to discuss mid-semester progress (April and Laurie)
- 3/4/97 Meeting with Peter Caleshu (April and Laurie)
- 3/6/97 General Team Meeting (all team members)
- 3/8/97 Meeting with Peter Caleshu to discuss survey spreadsheet (April)
- 3/11/97 Meeting to discuss Vegetation and Wildlife (Kris and Tracey)
- 3/18/97 Meeting with Tom O'Leary and Chris Russell (Lisa)
- 3/18/97 Meeting with Betty Adelson, Conservation Commission Administrator (Lisa)
- 3/19/97 Meeting with Betty Adelson (Lisa)
- 3/26/97 Open Space Meeting (April and Laurie)
- 3/26/97 Meeting with Peter Caleshu and Dimitri Hoffmeyer, outside computer consultant, to set up survey formulas (April and Laurie)
- 3/27/97 General Team Meeting (all team members)
- 3/29/97 General Team Meeting (April, Kris, Laurie and Tracey)
- 3/29/97 Meeting to work on the Conservation/Recreation Inventory (Kris and Tracey)

4/1/97 Meeting to work on the Conservation/Recreation Inventory
(Kris and Tracey)

4/2/97 Meeting to work on the Conservation/Recreation Inventory
(Kris and Tracey)

4/6/97 General Team Meeting (all team members)

4/7/97 Meeting with Barbara Drozek to discuss historical sites (Laurie)

4/7/97 Meeting with Carol Cashman (Laurie)

4/7/97 Meeting with Betty Adelson to discuss the buildout (Lisa)

4/8/97 General Team Meeting (all team members)

4/8/97 Meeting with Betty Adelson (Lisa)

4/8/97 Meeting with Chris Russell (Lisa)

4/10/97 Meeting to prepare draft (Kris, Laurie, Lisa and Tracey)

4/15/97 Photo-taking in Lynnfield (Kris and Tracey)

4/17/97 General Team Meeting (April, Kris, Lisa and Tracey)

4/18/97 Meeting with Chris Russell (Lisa)

4/19/97 Meeting to produce overheads for presentation (April and Kris)

4/21/97 Photo-taking in Lynnfield (Lisa)

4/22/97 General Team Meeting (April, Kris, Lisa and Tracey)

4/24/97 General Team Meeting (April, Kris, Laurie and Lisa)

4/26/97 Video-taping in Lynnfield (April and Laurie)

4/26/97 Meeting to work on the Conservation/Recreation Inventory
(Kris and Tracey)

4/26/97 Photo-taking in Lynnfield (Lisa)

4/27/97 General Team Meeting (all team members)

4/28/97 Meeting with Betty Adelson (Kris)

4/28/97 Meeting with Alan Dresios, Lynnfield Planning Board (Lisa)
4/29/97 General Team Meeting (all team members)
4/30/97 Editing Meeting (April, Kris, Laurie and Tracey)
4/30/97 Open Space Meeting (Lisa)
5/2/97 Editing Meeting (all team members)
5/3/97 Editing Meeting (April, Kris, Laurie and Tracey)
5/4/97 Final Paper Preparations (April, Kris, Laurie and Tracey)
5/5/97 Final Paper Preparations (April and Kris)

Section IX

Glossary

ACEC Program: An Area of Critical Environmental Concern must contain a resource complex of regional, statewide or national significance with at least four of the following features: fishery habitat, inland wetlands, inland surface waters, water supply areas, natural hazard areas, agricultural areas, historical/archeological resources, habitat resources or special use areas. The purpose of the ACEC program is to identify and protect critical resource areas ranging from wetlands and wildlife habitats to farmland and scenic landscapes. Once the Secretary of Environmental Affairs designates an area, state environmental agencies are then directed to administer programs and review projects, in cooperation with local zoning efforts, in order to protect the ACEC.

Alluvium: Sediment deposited by streams in non-marine environments.

Aquifer: A geologic formation, group of formations or part of a formation, capable of storing and releasing groundwater to wells and springs (Witten and Horsley 1996).

Bedrock: The continuous mass of solid rock which forms the earth's crust and underlies the soil.

Best Management Practices: Operational procedures designed to minimize the impact of certain activities or land uses on groundwater or surface water quality.

BOD: Biologic Oxygen Demand. The amount of oxygen used up in the respiration of organic matter by decomposers in an aquatic ecosystem.

Buffer Zone: A strip of land established to protect one type of land use from another with which it is incompatible.

Bylaw: A law created by a municipality, often written to supplement existing state regulations with more stringent or specific regulations.

Cultural Eutrophication: The natural trend is for lakes to become colonized by plant life. The organic content of the lake bottom is increased by biologic activity. One natural result of this process is that it is the destiny of most lakes to fill up and disappear over a few thousand years. Human activity can accelerate the dynamics of this process. This is known as cultural eutrophication. The prime culprit in cultural eutrophication is phosphorous runoff from agricultural and domestic fertilizers. Although phosphorous is a natural

element found in rocks and soils, humans have contributed high concentrations through fertilizer use. Phosphorous feeds algae causing it to multiply. Dead decomposing algae falling to the bottom of lakes depletes oxygen levels. Decreased oxygen levels at the bottom cause species such as deep water trout and salmon to die and decompose, further depleting oxygen and accelerating the process. Hyper-eutrophication leads to massive algae blooms, low oxygen, low transparency, large fish kills and a very unhealthy water body.

Floodway: The part of the floodplain that is involved with the flow of flood waters as well as storage.

Freshwater Marsh: Open wetlands with fresh water shallow enough to support a dense emergent plant cover rooted in soil, but deep enough to inhibit the growth of woody plants. Marsh soils are generally saturated year-round and consist of a combination of mineral and organic elements.

GIS: Geographic Information System. A tool for spatially arranging data sets.

Glacial Till: A non-sorted sediment deposited directly from glacial ice.

Groundwater: The water contained within the earth's surface that has permeated the surface from precipitation and infiltration by streams, ponds and lakes.

Loam: Soil rich in organic matter.

Massachusetts Endangered Species Act: Signed into law in 1990, the Act: 1. prohibits the taking of any listed (endangered, threatened, or special concern) plants and animals unless specifically permitted for scientific, educational or propagation purposes; and 2. protects designated habitats by requiring permits before any alterations to the habitat can take place. No habitats have yet been listed in Massachusetts.

Endangered: Any species of plant or animal in danger of extinction throughout all or a significant portion of its range. Any species of plant or animal in danger of extirpation as documented by biological research and inventory.

Threatened: Any species of plant or animal likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Any species of plant or animal that is declining or rare as determined by biological research and inventory.

Special Concern: Any species of plant or animal which has been documented by biological research to have suffered a decline that could threaten the species if allowed to continue unchecked, or which occurs in small numbers or with such a restricted distribution or specialized habitat requirements that it could easily become threatened within Massachusetts.

Unofficial Watch List: Any species of plant or animal that scientists have become concerned about or think might become listed as Endangered, Threatened or Special Concern.

NPDES Permit: National Pollution Discharge Elimination System Permit. An NPDES Permit is required by the federal Clean Water Act for all point source discharges to wetlands and waterways.

Outwash: Stratified drift (layered sediment) deposited by glacial melt-water streams.

Permeability: A measure of how easily a solid allows fluid to pass through it.

Redlining: The editing of map contents.

Runoff: Water that travels as overland flow during and immediately after a storm or snow melt.

Soil Complex: A grouping of soils which are related to one another by formation or common characteristics.

Substratum: The lowest or underlying layer of soil. Soils are divided into horizons depending upon their composition and stage of evolution. The substratum is the lowest of these horizons.

Surficial Deposits: The deposits which overlie the bedrock. These deposits may be formed through deposition or from the breakdown of parent bedrock.

Underground Storage Tank: A nonportable container which is used to store an accumulation of toxic or hazardous substances beneath the surface of the ground.

Vernal Pools: Temporary bodies of freshwater that provide critical habitat for numerous vertebrate and invertebrate species. They are often small and shallow, but can support rich communities of wildlife. In Massachusetts, vernal pools that meet certain biological and physical criteria are certified by the Natural Heritage and Endangered Species Program, thus qualifying for various forms of regulatory protection.

Wildlife Corridor: A linkage between isolated habitat areas that allows for the movement of wildlife between them. The corridor can function as a habitat itself, as an enabler of seasonal migration or as a facilitator of species dispersal.

Section X

Annotated References

Benyus, Janine E. 1989. Field Guide to Wildlife Habitats of the Eastern United States. New York: Fireside.

This is a field guide that organizes its information by habitat type (e.g., sandy beach and dune, salt marsh, lake and pond, cattail marsh, sedge meadow, etc.). Habitat descriptions include geological and ecological histories; special features; three detailed wildlife profiles (bird, mammal, and amphibian or reptile); a list of characteristic plants; and an illustration and a map.

Camp Dresser and McGee (CDM). 1992. Saugus River Flood Control Improvements: A Report to the Saugus River Watershed Committee.

This study addresses flooding conditions from the headwaters of the Saugus River at Lake Quannapowitt in Wakefield to the downstream limit of the River at Center Street in Saugus. Its purpose was to provide the Saugus River Watershed Council with a comprehensive description of current drainage and flooding problems, while considering the potential for future development within the watershed. The study also offers recommendations for alleviating these problems.

Crow, Garrett E. 1982. New England's Rare, Threatened and Endangered Plants. U.S. Department of the Interior, Fish and Wildlife Service, Northeast Region/New Hampshire Agricultural Experiment Station and University of New Hampshire.

This is a report on the New England plant taxa listed under the Endangered Species Act, proposed for Federal listing, under review for Federal listing, and of national significance. For each species, the report provides its status; family; distinctive features; distribution (including map); habitat; flowering period; endangerment; recommendations; and an illustration.

Data Center of the Metropolitan Area Planning Council. 1995. Lynnfield Community Profile.

Dawson, A. and S. Zielinski. 1997. Environmental Handbook for Massachusetts Conservation Commissions. Belmont: Massachusetts Association of Conservation Commissions.

A comprehensive guide to the laws, regulations and programs protecting land and water resources in Massachusetts. The purpose of the Handbook is to assemble in one place sufficient information to allow members of Conservation Commissions to accomplish their duties. The book is also designed for use by local, state and federal officials, landowners and environmental consultants.

Downe and Wells Associates. 1985. Town of Lynnfield Conservation and Recreation Map.

Dunne, T. and L. Leopold. 1978. Water in Environmental Planning. New York: W.H. Freeman.

A comprehensive text covering all aspects of hydrology in environmental planning.

Federal Emergency Management Agency. 1990. Flood Insurance Study: Town of Lynnfield, Massachusetts.

The purpose of this study was to investigate the existence and severity of flood hazards in the Town of Lynnfield and to aid in the administration of the National Flood Insurance Act of 1968 and in the Flood Disaster Protection Act of 1973.

Goldin, Alfred J. 1977. Wild Mammals of New England. Baltimore: The Johns Hopkins University Press.

This is a comprehensive natural history reference book that provides detailed information on the various mammal species found in New England. For each species, the author provides the popular and scientific names; locale; general description; geographic distribution; ecology; and behavior.

Hall, G. and A. Kreiger. 1996. Local Wetlands Bylaws and Hearings. Cambridge: Anderson and Kreiger.

This is a handout produced for distribution at a bylaw workshop given at the annual meeting of the Massachusetts Association of Conservation Commissions.

Leahy, Christopher. The Nature of Massachusetts. 1997. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.

This is a comprehensive description of the various habitat types and plant and animal species found within them that are indigenous to Massachusetts.

Lynnfield and Wakefield, Massachusetts Conservation Commissions. March 1994. ACEC Nomination Proposal for Lynnfield Marsh (Reedy Meadow).

In pursuit of Area of Critical Environmental Concern (ACEC) designation by the state for Reedy Meadow, the Conservation Commissions of the Towns of Lynnfield and Wakefield compiled a detailed report on the area. The report included information on the Meadow's wildlife and vegetation, educational uses,

flood storage impact, role as water supply, current threats facing it, and planning and management goals.

Lynnfield Board of Water Commissioners. 1996. Fifty-seventh Annual Report of the Officers of the Lynnfield Water District.

Lynnfield, Essex County: Community Profiles. n.d. Internet - <http://www.magnet.state.ma.us/dhcd/iprofile/164.htm>.

Lynnfield Business Coalition for Better Schools. n.d. Lynnfield Public Schools.

Lynnfield High School Guidance Department. 1996. Lynnfield High School Profile.

Lynnfield Historical Commission. 1995. Guide to Historic Lynnfield.

Lynnfield Historical Commission. 1975. Lynnfield: A Brief History.

Massachusetts Department of Environmental Management. n.d. Massachusetts Scenic Landscape Inventory.

Massachusetts Department of Environmental Protection. 1994. Nonpoint Source Management Manual. Boston: DEP.

This manual provides basic information for local officials on how to identify, inventory and control nonpoint source pollution sources through environmental planning, local bylaws and regulations.

Massachusetts Executive Office of Communities and Development. 1993. Lynnfield, Essex County: A Community Profile.

The office that produced this report is now known as the Division of Housing and Community Development.

Massachusetts Executive Office of Environmental Affairs. 1995. Open Space Planner's Workbook.

This is a step by step guide designed to aid communities in the process of compiling an Open Space and Recreation Plan.

Metropolitan Planning Council. 1992. North Suburban Water Supply Protection Plan.

This study examined the drinking water sources of nine Boston area suburbs (including Lynnfield) and offered recommendations for protecting these sources.

New England Environmental, Inc. March 1995. Town of North Reading, Massachusetts Conservation and Recreation Plan.

Pahlavan, D. 1996. MassGIS Open Space Mapping Project.

Palmer, Laurence E. (Revised by H. Seymour Fowler). 1949 (revised 1975). Field Book of Natural History. (second edition) United States: McGraw-Hill Book Co.

Snyder, R. 1991. Looking to the Future. Saugus, Massachusetts.

This manual was designed to be used as an action plan for the protection of the Saugus River.

Tashiro, J., R. Schmidt, et al. 1991. Baseline Assessment of the Saugus River System, Massachusetts. Annendale-on-Hudson: Hudsonia Limited.

This study established a baseline data set for the Saugus River System.

Terrene Institute and U.S. Environmental Protection Agency (Region V Water Division). 1995. Local Ordinances: A User's Guide. Washington, DC.

This manual provides abstracts from seven independent reports on issues involved in preparing local ordinances (known as bylaws in Massachusetts).

United States Department of Agriculture, Natural Resource Conservation Service. 1981. Soil Survey of Essex County, Massachusetts, Southern Part.

Natural Resource Conservation Service (formerly known as Soil Conservation Service) provides information on soil complexes, limitations and classification.

United States Department of the Interior, Geological Survey. 1983. Bedrock Geologic Map of Massachusetts (Sheet 1).

United States Department of the Interior, Geological Survey. 1987. Reading, Massachusetts Topographical Quadrangle, No. 42071-E1-TM-025.

United States Department of the Interior, Geological Survey. 1985. Salem, Massachusetts Topographical Quadrangle, No. 42070-E7-TM-025.

Wiswall, Marcia Wilson, ed. 1977. Lynnfield: A Heritage Preserved 1895-1976. Canaan, New Hampshire: Phoenix Publishing.

Witten, J. and S. Horsley. 1996. A Guide to Wellhead Protection. Washington, DC.

A guide to preventing groundwater contamination.

Yahner, Richard H. 1995. Eastern Deciduous Forest: Ecology and Wildlife Conservation. Minneapolis: University of Minnesota Press.

This book provides information on the wildlife, history, and ecological processes of the eastern deciduous forest of North America. In addition, it explores issues such as forest fragmentation, corridors and edges, biodiversity conservation, atmospheric concerns, and challenges for the future health of the forest.