

Duxbury Comprehensive Plan

December 6, 1999



Duxbury Planning Board

Prepared by: John Brown Associates Inc.

**In Association With: Daylor Consulting Group
and Bluestone Planning Group**

Duxbury

Comprehensive Plan

Duxbury, Massachusetts

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**Prepared by: John Brown Associates Inc.
2464 Massachusetts Avenue, Cambridge,
Massachusetts**

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TABLE OF CONTENTS

	Page
Introduction and Executive Summary	E-1
Section 1: Land Use	1-1
1.1 Land Use Inventory	
1.2 Land Use Changes Since 1969	
1.3 Buildout Analysis	
1.4 Land Use Goals & Policies	
1.5 Recommendations For Future Land Use	
Appendix 1-1: Buildout Specifications under Existing Zoning and Guide Plan)	
Appendix 1-2: Options for Future Residential Use	
Section 2: Economic Base	2-1
2.1 Population	
2.2 Employment/Labor Market	
2.3 Economic Base	
2.4 Market Area Characteristics	
2.5 Goals & Policies For Economic Base	
2.6 Economic Base Recommendations	
Section 3: Natural and Cultural Resources	3-1
3.1 Existing Natural & Cultural Resources, and Provisions For Their Protection	
3.2 Existing Cultural & Historical Resources, and Provisions For Their Protection	
3.3 Goals & Policies For Natural & Cultural Resources	
3.4 Recommendations For Natural & Cultural Resources	
Appendix 3-1: Inventory of Conservation and Open Space Lands in Duxbury	
Appendix 3-2: The Process of Protecting Historic Properties	
Appendix 3-3: Natural & Cultural Resource Protection Tools Available to Duxbury	

(Table of Contents Continued)

Section 4: Housing	4-1
4.1 Overview of Existing Housing Conditions	
4.2 Demographic Trends Affecting Housing	
4.3 Housing Needs Assessment	
4.4 Goals & Policies For Housing	
4.5 Housing Recommendations	
 Section 5: Public Facilities and Services	 5-1
5.1 Inventory of Municipal Facilities	
5.2 Public Schools	
5.3 Playgrounds & Recreational Playfields	
5.4 Water Supply & Sewage Disposal Systems	
5.5 Goals & Policies For Public Facilities & Services	
5.6 Public Facilities Recommendations	
Appendix 5-1: Fire Protection Standards	
 Section 6: Transportation	 6-1
6.1 Overview of Existing Transportation Conditions	
6.2 Assessment of Transportation Facilities & Services	
6.3 Transportation Goals	
6.4 Transportation Recommendations	
 Section 7: Implementation Plan	 7-1
7.1 Regulatory Analysis	
7.2 Other Growth Management & Regulatory Mechanisms	
7.3 Capital Budgeting	
7.4 Open Space Acquisition	
7.5 Local Planning Capacity	
7.6 Other Implementation Recommendations	
Appendix 7-1: Summary Schedule for Comprehensive Plan Implementation	

(Table of Contents Continued)

LIST OF FIGURES

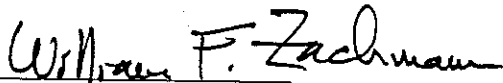
- 1-1 Existing Land Use
- 1-2 Developable Land
- 1-3 Zoning Map
- 1-4 Guide Plan For Future Land Use
- 2-1 Distribution of Employment in Duxbury
- 2-2 Business Areas
- 3-1 Existing Open Space
- 3-2 Constraints on Development
- 3-3 Water Resources
- 3-4 Priority Areas For Open Space Acquisition
- 4-1 Residential Assessed Values for FY 1999
- 4-2 Median Residential Sales Prices, 1992-1996
- 4-3 Household Forecast For Duxbury
- 5-1 Public Facilities
- 6-1 Functional Classification of Duxbury Streets

Comprehensive Plan

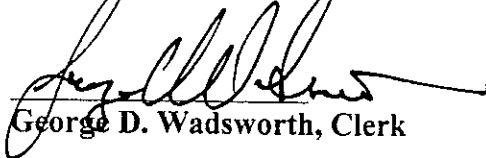
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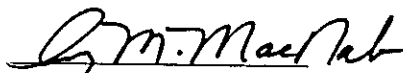
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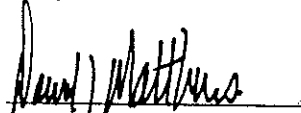
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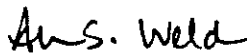
George D. Wadsworth, Clerk



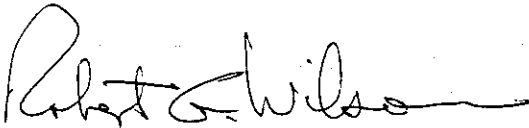
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DUXBURY COMPREHENSIVE PLAN 1999

EXECUTIVE SUMMARY

Introduction

Duxbury, Massachusetts is a coastal town of almost 15,000 residents located 33 miles south of Boston in Plymouth County.

The Town has a history of community planning including the *General Plan for the Town of Duxbury* in 1962, the *Duxbury, Massachusetts Comprehensive Plan* in 1968, and the *Duxbury Comprehensive Plan Statement* in 1973. Duxbury owes much of its beauty, charm and functionality to its past planning efforts.

Broad Goals. There is a clear, broad consensus on major “bigger picture” goals for the Town of Duxbury. Various other issues are and are likely to continue to be controversial. Nevertheless, based upon the Town Survey and many other inputs, an overwhelming majority of Duxbury residents and voters strongly support widely shared common objectives. Such broadly shared aims include:

- To preserve the semi-rural, historical, residential character of the Town;
- To provide first rate, top quality education in our schools;
- To protect the Town’s water supply and the water of our lakes and ponds, our harbor and beaches;
- To maintain and improve environmental quality;
- To ensure a sound fiscal basis for the Town while minimizing the tax burden on residents;
- To provide and enhance recreational facilities for all residents; and
- To increase the amount of protected undeveloped open space in the Town.

Controlling Our Future. Given these commonly shared aims, the build-out analysis prepared in the course of this 1999 revision to the Comprehensive Plan for the Town of Duxbury is cause for concern. It shows that full build-out under current zoning bylaws and other regulations would lead to a degree of development and resulting population densities difficult to reconcile with the broad goals that Duxbury's citizens have for their Town.

Many in Town believed that the build-out analysis would show that “there really is not much room left for further development in Duxbury.” This simply is not correct. On the contrary, the build-out analysis shows that given straightforward application of the zoning laws and other regulations now in effect, the number of dwelling units could increase from the current number of 5,737 to 10,082, an increase of 4,345 units (76%). Assuming regulations currently in effect are strictly followed, this would mean an increase from the 1998 population of 14,880 by an additional 11,997 residents (80%) to a total of 26,877.

In order to assess correctly the implications of the build-out analysis, it is important to understand exactly what it represents. A build-out analysis is a standard planning technique. The build-out analysis projects what Duxbury could eventually become, assuming full build-out under zoning laws, regulations, and other conditions currently in effect. It makes no projection as to when or even whether Duxbury will reach full build-out. It simply describes a likely result of full build-out to the maximum practical allowable density.

The build-out analysis is not, however, based upon abstract, impractical, worst case assumptions or simply upon allowable development densities in the Zoning Bylaw without further analysis. It explicitly takes into account, for example, natural factors that tend to limit actual development. Such factors include wetlands, water, and power lines as well as land having severe septic limitations. The build out analysis is, by its very nature, a picture of a fully developed Duxbury at some time in the future, not a picture of what Duxbury will necessarily be in the immediate future. It could take decades for Duxbury to reach full-build out. However it also could come much faster than straightforward projections based upon recent building rates might suggest.

Pressures for Development. In fact, the build-out analysis may understate the ultimate build-out potential in a number of ways. It does not, for example, take into account the trend in recent years to expand or replace existing smaller houses with larger ones. It does not take into account additional population density created by the large and growing number of “in-law” apartments that are, in fact, making many ostensibly single-family residences into multi-family dwellings.

Furthermore, the build-out analysis assumes that the current regulations that affect density of development will be enforced as written. The actual experience of development over the last ten years within the Town of Duxbury provides sufficient examples to suggest that this could be an overly optimistic assumption.

In part, that is merely due to the inherent difficulty for citizen boards, whether elected or appointed, to say no to their fellow citizens. There is a constant temptation to make what individually may appear to be “small” exceptions but which, as they multiply and accumulate over the years, can become significant differences in the total density of development in the Town.

Most important of all, however, there are substantial, fundamental economic forces at work that strongly motivate the densest possible development. Simply put, the more house lots and the larger the houses that can be squeezed onto a particular plot of land, the more square feet of retail or office space that can be shoe horned into a neighborhood business district, the more money there is to be made.

Density Conflicts With Goals. Even without such pressures the future Duxbury shown in the build-out analysis is not easily reconciled with the one called for by the broadly shared goals of its citizens. Density is the crux of the matter. The unique quality and character of a Town like Duxbury; its schools, its water supply, its beaches and other natural resources, its fiscal underpinnings, its recreational facilities, its open space; is not lost in any immediate crisis. It is far more likely to be slowly, gradually, eroded over time by increasing density of development.

Ten or twenty or thirty years go by and the cumulative effect is that the entire landscape is altered in a manner inconsistent with the common objectives. “Rural” transforms into “semi-rural” until

suburbanization is complete. More and more households are added that cost more in schools and other services than they bring in as tax revenue. Water quality declines as, despite the best intentions of the apparent regulations, runoff from development impacts Town wells already challenged to serve a growing population. The beach and other recreational facilities become increasingly crowded and eventually damaged by over-use. Once quiet country roads become hazardous thoroughfares. More and more open space is developed for understandable short-term economic advantage to landowners and developers but at increasing long-term cost to the Town.

A future Duxbury with ten thousand dwelling units would be a very different Duxbury than the present Duxbury with just over half that. A future Duxbury with nearly 27,000 residents would be a very different Duxbury than the present Duxbury with just under 15,000. It does not require any great degree of insight to see that the future Duxbury of the build-out analysis could be one in which nearly all the broad goals the citizens have for their Town will be very much at risk.

Role of PD Zoning in Build-Out Densities. A key to the matter lies in the development densities permitted in the cluster and planned unit development (PD) sections of the Zoning Bylaw. When adopted, the aim of these provisions was to increase open space, to provide greater watershed protection, to provide more diversity in housing, and to create a more favorable economic impact by creating households less likely to have children and therefore less likely to be a net incremental cost to the Town. The increased densities allowed under these sections of the Zoning Bylaw, however, are also the primary reason why the potential build-out densities are so high.

Although it continues to be widely believed that these provisions of the Zoning Bylaw do not increase density of development but merely bring dwellings closer together to preserve open space, the facts are very different. Even the cluster development provisions, in practice, can lead to greater densities by permitting land otherwise impractical to develop to be included in allowable density calculations. The planned unit development (PD) provisions, however, explicitly allow substantially greater densities of development than are possible under standard residential development.

A flat, twenty-acre tract of land with no septic problems, under the provisions for standard residential compatibility (RC-1 zone) development, is unlikely to yield more than 15-16 house lots even under the most favorable conditions. More typically, land requirements for roadways and drainage and other regulatory and natural limitations will mean that no more than 12-13 house lots can be developed on a twenty-acre parcel.

If that same land is PD-2 zoned, however, then it can potentially be developed with as many as 80 residential units, more than five times the density of a standard residential RC-1 development. In fact, 304.3 acres of land classified as "highly developable" by our consultant and 150.2 acres of moderately developable land is currently zoned PD-2.

The same twenty acres, zoned PD-1, can be developed with as many as 50 residential dwelling units, more than three times the practical density under standard residential development. Undeveloped land in Duxbury currently zoned PD-1 and classified as highly developable amounts to 439.1 acres with another 457.9 acres of moderately developable PD-1 land.

The increased densities allowed in planned development districts are the major factors that create the surprisingly high numbers seen in the build-out analysis. Modifications to the cluster and

planned unit development sections of the Zoning Bylaw could help to bring the build-out potential more in line with the broad goals of the majority of Duxbury's citizens. Modifications to the PD sections of Zoning Bylaw could also strengthen them to better serve their original goals: to increase open space, to improve watershed protection, to provide more diversity in housing, and create more favorable economic impacts, and so forth.

The point of all this is certainly not to suggest that the cluster and planned unit development sections of the Zoning Bylaw be eliminated. That would be a case of throwing out the baby with the bath water. It is, rather, that given increasing economic pressures of regional growth, growing local real estate demand as a result of the new commuter train and sustained economic prosperity, and powerful new economic incentives for developers now to maximize density of development, the time to carefully revisit the provisions of the Zoning Bylaw as a whole is at hand.

Neither is the point of all this that it is in any way wrong for owners of developable land to profit from its development. Nor is it wrong for developers to profit from the development of land. The point is appropriate balance. We need to balance the recently increased pressures for growth and greater density of development with equally strong measures to ensure a future Duxbury consistent with the broadly shared goals of the overwhelming majority of its citizens.

There is Still Time for Constructive Action. Today, in 1999, we still have time to make constructive changes. We still have time to tighten up our zoning laws, revise them to better control ultimate build-out densities, build in additional checks and balances against giving in to the strong pressures favoring more and denser development. Adopting clearer and more explicit requirements and a wider distribution of powers among the various land use boards can also help.

There is strong support for Open Space Planning as evidenced by the unanimous vote at Town Meeting in 1998 to acquire Camp Wing. The level of cooperation among land-use boards is very good and continues to improve. Action agendas by other boards are already in effect to support the goals that are reflected in this plan. We therefore have a firm foundation on which to build Duxbury's future in a manner consistent with the goals of its citizens for the Town.

Our Choice is Clear. Growing economic pressures for development will gradually but steadily, erode the Town and the environment that we cherish, unless we take the appropriate action. We can take stronger measures to control the density of future development -- or we can do nothing and face the near certainty that our most desired goals will eventually be compromised. Which course we take will, in the end, be up to the voters at Town Meeting to decide.

Section 1: LAND USE

Section 1: LAND USE

Introduction

Land use is the key element in the Town's comprehensive plan. The use of land is central to the function and character of the community. All other systems support the use of the land, including transportation, public facilities, environmental protection and regulatory controls. The community's future well-being and economic potential is directly related to the future use of the town's land.

Duxbury is primarily a suburban community, although less than half of its land area has been developed. Some of the remaining undeveloped land is not developable because of wetlands or other restrictions. The predominant use in developed areas is residential. Still, the soul of the town is its undeveloped open spaces. The Town is committed to preserving its character through the acquisition of open space, as evidenced by the recent acquisition of over 350 acres at Camp Wing.

1.1 LAND USE INVENTORY

The land use pattern of a community is continually changing. Factors that determine the land use pattern include availability of water supply, utilities, soil suitability, topography, regional economics, accessibility and similar opportunities and constraints.

The current existing land use inventory was conducted by means of a number of methods. MassGIS (Executive Office of Environmental Affairs) provided land use data based on 1991 aerial photography, which was very valuable as a starting point. An updated 1998 land use map was compiled through the combination of these aerial photographs, field surveys, and Planning Board and other Town records. (See Figure 1-1.)

Tabulation of Existing Land Use

The mapped areas were measured to determine the acreage in each category of land use. This information is shown in Table 1-1.

Table 1-1
Existing Land Use (June 1998)

<u>Land Use</u>	<u>Acres</u>	Percent of Total Town <u>Area</u>	Percent of Developed Land <u>Area</u>
Residential	4,430.1	28.6%	44.3%
(multifamily)	(73.0)	(0.5)	(0.7)
(single family)	(4,357.1)	(28.2)	(43.6)
Commercial	74.5	0.5	0.7
Public/Semi-Public	4,106.5	26.6	41.1
(recreation)	(299.0)	(1.9)	(3.0)
(other public/semi public)	(147.1)	(1.0)	(1.5)
(protected open space)	(3,660.4)	(23.7)	(36.6)
Transportation*	<u>1,384.3</u>	<u>9.0</u>	<u>13.8%</u>
Total Developed	9,995.4	64.7%	100.0%
 Agriculture	836.8	5.4	
Other undeveloped land	<u>4,188.9</u>	<u>27.1</u>	
Total Undeveloped Land	5,025.7	32.5%	
 Water	<u>432.9</u>	<u>2.8%</u>	
Total Town Area	15,454.0	100.0%	

Source: Mass GIS, Town records, field surveys

* Local roads were not accounted for in the land use maps provided by MassGIS, thus a portion of land was allocated from other categories to estimate the area in local roads. This was added to regional transportation acreage to provide total area in transportation use.

An analysis of each type of land use in Table 1-1 is provided below.

Developed Land

The Town of Duxbury contains approximately 15,454 acres (24.15 square miles) of which 15,021 acres are land and 432.9 acres are water bodies. Developed or protected land comprises 9,995 acres, or 64.7% of the town's total area.

Residential Uses

The predominant developed land use in Duxbury is residential, constituting 44.3% of the developed land area. Of the residential uses, single-family homes constitute the vast majority of the residential development. There currently are approximately 5,003 one-family homes and an estimated 572 multifamily units in Duxbury. A total of 4,357 acres is in one-family development. Multifamily development comprises 73 acres. Multifamily residences are defined as those containing three or more units. Additional information on the characteristics of the housing stock is contained in the section on housing.

Residential development is located in all sections of Duxbury. Single-family residential neighborhoods are located throughout the town, with the highest density found east of Tremont Street. Multifamily residences are scattered in various spots, mainly along major roads such as Route 53, Route 3A, and Route 14.

Commercial Uses

Commercial uses make up 75 acres, or 0.7% of the developed land area. Retail facilities are concentrated in neighborhood commercial areas including Halls Corner (the largest retail area), Cox Corner, Millbrook, Tarkiln, Island Creek, Bennett's Corner, Bailey's Corner, Snug Harbor, Osborne's, and a few other sites. There is no industrial use identified in the town, although there are a few heavier commercial uses such as contractors' yards, tradesmen, and repair services.

Public and Semi-Public Uses

Within this category are three distinct types of land use that are either publicly-owned or are institutions which serve the public, such as churches and non-profit organizations. Together, public and semi-public uses comprise 4106 acres, or 41.1% of the total developed land area.

Recreation. This category consists of a number of active recreation facilities, including playfields, parks, two golf courses and recreational marine facilities. These are described in more detail in the Public Facilities section and in the 1997 Open Space and Recreation Plan. The total land area in this category is 299 acres.

Other Public/Semi-Public. This category includes public property and institutional uses that are privately owned, but which are open to and serve the public. Public property is land serving the public which is owned by a public body, including such uses as public schools, the library, Town Hall, Town parks and Town cemeteries. Examples of other institutional uses include private schools, places of worship, private cemeteries and fraternal or service organizations. Institutional uses are located in widely scattered areas of the town, totaling 147 acres. A more detailed discussion of public uses is contained in the section on public facilities and services.

Protected Open Space. As of June, 1998, there were 3,660 acres of protected open space in Duxbury, including land owned by the town and under the jurisdiction of the Conservation Commission, the Commonwealth of Massachusetts, the Water Department, the Duxbury Rural & Historical Society, and private non-profit land preservation organizations. Protected open space covers 23.7% of the Town's land area. Section 3, Natural & Cultural Resources, provides a detailed inventory and map of these lands.

Transportation

This category includes 1,201 acres of local roads and 183 acres covered by Route 3. Transportation represents 13.8% of the total developed land area, including all town, state and county roads in Duxbury as well as a number of private ways open to the public.

Undeveloped Land

There are approximately 5,026 acres of vacant and undeveloped land in Duxbury, which includes 837 acres of agricultural land, all of which represents 32.5% of the town's total land area.

Vacant Land. There are 4,189 acres of vacant land in the town (27.1% of total town area), not counting agricultural land. Much of this land is undevelopable because of the presence of wetlands, unsuitable soil types, or other considerations. The amount of land that is actually developable is quantified in the next section under Buildout Analysis.

Agriculture. A significant portion of the town's undeveloped land is in agricultural use, including plant nurseries, minor crops and hayfields. Approximately 837 acres are used for agriculture, or 5.4% of the town's total area. This includes 508 acres of cranberry bogs.

Water Bodies

Water bodies comprise 433 acres, or 2.8% of the town's total area. Water bodies include Island Creek Pond, South River Reservoir, Wright Reservoir, Pine Lake, North Hill Marsh, Round Pond, Mill Pond, Upper and Lower Chandler Mill Ponds, and various other ponds, rivers, and streams. Coastal waters are not included.

1.2 LAND USE CHANGES SINCE 1969

A substantial amount of growth has taken place in Duxbury over the past 30 years. There has been strong pressure for growth, especially since the extension of Route 3 through Duxbury, which brought the town within the limits of the Greater Boston area. The greatest impact has been in residential development, as suburbanization has taken place. In addition, public facilities have been expanded to serve the needs of increasing numbers of families. Although most of the development has been in single-family homes, the present zoning bylaw permits a variety of housing styles in planned development projects, and a moderate number of multifamily, townhouse, and condominium units have appeared.

The opening of Route 3 in the 1960s actually brought about a decline in commercial activity that once took place along Route 3A. However the commercial presence in the traditional business centers scattered throughout the town has grown. To date, no land use of an industrial nature has taken place in the town.

1.3 BUILDOUT ANALYSIS

The amount of developable land in Duxbury was determined by subtracting the developed land and undevelopable land from the total land area. Developed land includes all land shown to be in residential, or commercial use, as well as transportation and public/semi-public lands. Undevelopable land includes wetlands, water, and power lines combined with land having very severe septic limitations as shown in the maps provided by the University of Massachusetts for the Open Space and Recreation Plan. Also undevelopable are public and privately owned protected open space (does not include lands under temporary protection). Developable land is shown on Figure 1-2. Table 1-2 shows the quantities of developable and undevelopable land.

Table 1-2
Quantities of Developable and Undevelopable Land

<u>Total Town Area</u>	<u>15,454 acres</u>	<u>100.0%</u>
Land Already Developed	6,335	41.0
Wetlands and Water ⁽¹⁾	3,723	24.0
Protected Open Space (uplands only)	1,392	9.0
Very Severe or Severe Septic Limitations ⁽²⁾	1,357	8.8
Developable Land	1,618	10.5
Moderately Developable Land ⁽³⁾	1,029 acres	6.7%

Sources: 1998 Land Use (John Brown Associates, Inc.), MassGIS, 1997 Open Space & Recreation Plan

Notes:

- (1) Some areas reported as wetlands overlap with land already developed; where this occurs the area was included under the total developed area and not under wetlands.
- (2) Area includes only land not constrained by other factors.
- (3) Includes land in planned development zones that have moderate septic limitations or are within the Acquirer Protection Overlay District, and land in the neighborhood business zones that are underdeveloped and have moderate potential for future development.

Of the total land in the town, 5,115 acres are not developable because they are either wetlands or protected open space. An additional 1,357 acres have very severe or severe septic limitations. Approximately 2,647 acres remain to be developed. This includes land with no constraints on development as well as moderately developable land.

The developable land was identified by zoning district and zoning regulations were applied to determine the buildout capacity (see Appendix 1-1 for specifications). All development other than residential development at a density of 0.92 units per acre requires special permits. For moderately developable residential land, given the less conducive soil quality, it was assumed that no higher density development would take place (in all residential districts). Within the Acquirer Protection Overlay District no higher density development may take place. Figure 1-3 is the Zoning Map of the town. Table 1-3 shows the number of residential units and the amount of commercial space that can be developed under current zoning regulations.

**Table 1-3
Development Capacity Under Current Zoning**

<u>Zoning District</u>	<u>Acres</u>	<u>Buildout Capacity</u>
Residential Compatibility	1,234.1	1,074 dwelling units (d.u.) ⁽¹⁾
Planned Development District 1		
Highly Developable	439.1	1,194 d.u.
Moderately Developable	457.9	398 d.u.
Planned Development District 2		
Highly Developable	304.3	1,327 d.u.
Moderately Developable	150.2	131 d.u.
Planned Development District 3	—	—
Neighborhood Business Districts 1-3 ⁽²⁾⁽³⁾		
Highly Developable	14.4	163,100 s.f. (retail/commercial) 51 d.u.
Moderately Developable	42.6	482,500 s.f. (retail/commercial) 170 d.u.
Neighborhood Business District 4		
Highly Developable	3.7	82,200 s.f. (industrial) ⁽⁴⁾
Moderately Developable	2.5	32,700 s.f. (industrial)
Neighborhood Business District 5	—	—

Summary of Total Buildout Capacity

Total New Residential Units	4,345 dwelling units
Total New Commercial/Retail	645,600 s.f.
Total New Industrial	114,900 s.f.

(1) 1,345 dwelling units if cluster development.

(2) Where developable areas fall within the Acquirer Protection District the maximum number of dwelling units is 1.09 per acre.

(3) Reflects zoning change at Bennett's Corner passed at annual Town Meeting in 1998.

(4) Alternatively, office/commercial uses may be developed in the NB 4 district, but at a lower density. It is assumed for the purposes of the buildout analysis that the most intensive use will take place. For office uses in this district the maximum buildout capacity is 81,022 s.f. of building area.

Preliminary Analysis of Land Use Impacts (Under Current Zoning)

Market forces and the ability of the Town to provide services to meet resident and business needs will determine the rate at which development takes place, thus the full impacts of the buildout may not be felt for years to come (although the Town can control growth somewhat through zoning and other growth control mechanisms). A preliminary estimate of the changes that would occur as a result of development under current zoning regulations is provided here.

Residential Growth

The number of housing units can increase by approximately 4,345 units. The maximum number of units includes about 1,603 units of low density single-family homes and 2,742 units of higher density homes in mixed housing types. In 1997 the total number of housing units in the town was 5,643, including 5,003 single family units, and 640 multifamily or other types of units. The total number of housing units in the town can potentially grow by 76%.

The population growth that would accompany the increase in housing units would represent significant costs to the town for education and other public services. Using indices provided by the Massachusetts Department of Housing and Community Development (DHCD), the number of residents may increase by about 11,977. This represents a growth of 80% over the 1998 population of 14,880 persons. Education represents a major fiscal cost, thus the number of school-aged children that will result from growth is an important impact to consider. According to DHCD indices, the number of school-aged children would increase under this growth scenario by approximately 3,232 children⁽¹⁾.

Commercial and Industrial Growth

Developable nonresidential space in Duxbury is limited to the land available in the existing neighborhood business districts. Lands which are vacant and developable constitute about 15 acres in total, while an additional 45 acres are currently underutilized and have moderate potential for further development. Assuming that a mix of business and residential units will take place in Neighborhood Business Districts 1, 2 and 3, a total of 645,600 square feet of commercial/retail space can be developed. In the Neighborhood Business District 4 a total of 114,900 square feet of industrial space can be developed (although retail and service use is more likely). The commercial development that could take place (subject to market factors) in Duxbury represents a potential for about 1,435 additional retail/service jobs and 114 manufacturing jobs (estimating 1 employee per 450 square feet for office and retail space and 1 employee per 1,000 square feet industrial space.) In contrast to residential growth, industrial and commercial growth is likely to produce less of an increase in costs of government services; however, they do have requirements for infrastructure which can be costly and sometimes produce ancillary costs that are difficult to quantify.

⁽¹⁾ Estimates for population and schoolchildren are based on long term demographic expectations, although development in the short term may result in a relatively higher level of population growth. Population is expected to increase by 3.62 persons or 0.87 schoolchildren per household for low density single family homes, 3.30 persons or 0.71 schoolchildren per household for planned development districts, and 1.69 persons or 0.17 schoolchildren per household for multifamily development, based on DHCD estimates.

1.4 LAND USE GOALS AND POLICIES

The following land use goals and policies reflect the input from the Community Strategic Plan, the town-wide survey, input from public meetings, and comments by the town's public officials and private citizens.

1. Periodically review/adjust the rules and regulations for land development. Take a look at ways to make the process work better and to reflect the Comprehensive Plan.
2. Set aside sufficient amount of land to serve the needs of the School Community.
3. Balance growth with the capacity to provide water resources.
4. Provide access to and balance development around environmentally sensitive areas.
5. Reaffirm financial planning goals regarding tax rates and revenues.
6. Set aside sufficient amount of land to serve the needs of the Recreation Community.
7. Develop a responsible approach to land acquisition and management of open space.
8. Protect residential neighborhoods from adverse impacts of heavy traffic or incompatible uses.
9. Insure a continued balance between developed land and open space by allocating more land to permanent open space.
10. Reduce the potential development in the town by changing residential density requirements in some areas, if appropriate.
11. Redesignate some land in outlying areas of the town or environmentally sensitive areas from Planned Development to single-family development.
12. Continue the strategy of clustering community based retail and service uses in neighborhood or village center business districts rather than spread along highways in strip development patterns.
13. Locate any non-community based commercial enterprises (or heavier commercial uses) in areas separated from residential areas and convenient to regional highways.
14. Refine zoning bylaws for commercial and multifamily uses to protect neighborhoods.

1.5 RECOMMENDATIONS FOR FUTURE LAND USE

Primary Recommendations

1. Develop options to modify the Zoning Bylaw to reduce buildout density
2. Revise the Cluster/PUD section of the Zoning Bylaw to ensure consistency with Plan goals.
3. Increase the amount of land in permanent open space.
4. Do not expand neighborhood business zones except for a possible modest expansion of the Bennett's Corner District.
5. Redesignate land west of Route 3 and north of Franklin Street from PD districts to the RC district.
6. Establish requisite buffer areas for development near environmentally sensitive areas.

Secondary Recommendations

None.

Section 2: ECONOMIC BASE

Section 2: ECONOMIC BASE

Introduction

The purpose of this section is to review recent economic trends in Duxbury, anticipate the direction of future growth, identify economic goals, and propose specific recommendations for serving the town's population. The role of economic development in the community must also be more clearly defined.

Although the focus is on Duxbury, data on adjacent communities and regional groups is included for comparative purposes, so that a sense of Duxbury's role in the region is provided. Duxbury is part of the South Shore Coalition (SSC) subregion of the Metropolitan Area Planning Council (MAPC), which consists of Duxbury, Weymouth, Hingham, Scituate, Cohasset, Rockland, Hanover, Norwell, Marshfield, and Pembroke.

2.1 POPULATION

Much of the following information comes from the 1990 U.S. Census. More recent estimates and forecasts are based upon town-level research and data provided by MAPC.

Size and Growth

According to the Town Census, the population in 1998 was 14,880. The population of Duxbury grew very rapidly from 1970 through 1990. The growth rate from 1990 to 1998 was 7.1%.

**Table 2-1
Population And Growth Rates Since 1960 And Projections To 2020**

	<u>Duxbury</u>	<u>Massachusetts</u>	<u>MAPC SSC Subregion</u>
1960	4,727	5,148,578	-
1970	7,636	5,689,170	-
1980	11,807	5,737,037	182,876
% Change (1960 - 1980)	149.8	11.4	
1990	13,895	6,016,425	185,029
% Change (1980 - 1990)	17.7	4.9	1.2
1998	14,880		
<hr/>			
2000	14,880	6,388,885	194,682
% Change (1990 - 2000)	7.0	6.2	5.2
2010	15,058	6,720,604	200,926
2020	15,120	6,931,000*	205,752
% Change (2000 - 2020)	1.6	8.5	5.7

Source: U.S. Census, MAPC, MISER, Town Census

* 2020 population for Massachusetts from U.S. Bureau of Economic Analysis

Households

In 1998 there were 5,737 occupied housing units in Duxbury, which equates closely to the number of households⁽¹⁾. Household size and the forecasted rate of household growth are discussed in the Housing section.

Social Characteristics

The population characteristics show a fairly even age distribution. See Table 4-3 in the Housing section for age distribution and projections.

The ethnicity of Duxbury residents is predominantly White, with a small number of Blacks, Hispanics, and Asians.

Table 2-2
Racial And Ethnic Characteristics

	<u>1990</u>	
	<u>Persons</u>	<u>%</u>
White	13,582	97.7
Black	120	0.9
American Indian, Eskimo, Aleut	5	0.0
Asian or Pacific Islander	72	0.5
Hispanic Origin	94	0.7
Other	22	0.2

Source: 1990 U.S. Census

The educational attainment of residents in Duxbury is high compared to the state average. Approximately 46% of the population in 1990 had attended 4 or more years of college or university, while approximately 95% had graduated from high school. It is projected that a similar profile exists in 1997.

Table 2-3
Educational Attainment

	<u>% Completed</u> <u>High School</u>	<u>% Completed 4+</u> <u>Years College</u>
Duxbury	94.7%	46.5%
Plymouth County	83.8%	22.2%
Massachusetts	80.0%	27.2%

Source: 1990 U.S. Census

2.2 EMPLOYMENT / LABOR MARKET

⁽¹⁾ According to the U.S. Census, a household is a group of persons who occupies a single housing unit, while an occupied housing unit is an inhabited house, apartment, mobile home, a group of rooms, or a single room that is occupied as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall.

Economic characteristics are briefly reviewed below to provide an overview of the current economic situation in Duxbury. Included is information related to labor force, employment, education, and economic base.

Labor Force and Unemployment

In 1990 the annual average of persons in the civilian labor force was 6,859, representing a participation rate of approximately 73% of the population 16-69 years old. In 1996 there was an average of 7,390 people in the civilian labor force. Of these, 204 were unemployed, resulting in an unemployment rate of 4.3%. The unemployment rate has been in steady decline since its peak in 1992, following trends across the region and state. Over the last decade, unemployment rates in Duxbury have been consistently close to the state average, but lower than the rates in Plymouth County as a whole.

Table 2-4
Average Annual Labor Force And Unemployment, 1986 - 1996

	<u>Duxbury</u>		<u>Plymouth County</u>		<u>State</u>	
	Labor <u>Force</u>	Unemployment <u>Rate</u>	Labor <u>Force</u>	Unemployment <u>Rate</u>	Labor <u>Force</u>	Unemployment <u>Rate</u>
1986	5,764	3.8	206,160	4.5	3,058,283	3.8
1987	5,773	3.2	213,156	3.3	3,086,092	3.2
1988	6,882	3.3	219,504	3.5	3,154,492	3.3
1989	6,925	4.0	221,846	4.4	3,179,750	4.0
1990	7,158	6.0	229,884	6.9	3,242,000	6.2
1991	6,965	9.1	226,565	10.3	3,161,800	9.1
1992	7,009	8.6	225,493	9.8	3,162,000	8.5
1993	7,138	6.9	229,047	7.7	3,164,100	6.9
1994	7,307	6.0	233,882	6.3	3,167,100	6.0
1995	7,317	5.4	236,031	5.7	3,167,500	5.4
1996	7,390	4.3	236,402	4.9	3,189,100	4.5

Source: Massachusetts Division of Employment and Training

Occupation of Residents

In 1990, approximately 80% of Duxbury's labor force was employed in managerial, professional, technical, or sales occupations. Service and finance/investment/real estate fields together employed about 52% of Duxbury's labor force. In contrast, about 11% were employed in manufacturing, and just under 2% were employed in farming, forestry, or fishing. Generally, Duxbury has a diverse and balanced occupational composition.

**Table 2-5
Occupational Groups Of Residents**

	<u>1980</u>	<u>1990</u>
Managerial/Professional/ Tech/Sales/Admin	3,839	5,468
Service	493	472
Farm/Forestry/Fishing	74	128
ProdCraft/Repair	408	481
Oper/Fabr/Laborer	<u>269</u>	<u>310</u>
Total	5,083	6,859

Source: U.S. Census

**Table 2-6
Employment By Industry of Town Residents**

	<u>1980</u>		<u>1990</u>	
Agriculture & Mining	81	1.6%	124	1.8%
Construction	323	6.4	402	5.9
Manufacturing	676	13.3	765	11.1
Transportation, Communications & Utilities	369	7.3	383	5.6
Wholesale & Retail Trade	1,015	20.0	1,422	20.7
Finance, Insurance & Real Estate	609	12.0	959	14.0
Services	1,734	34.1	2,592	37.8
Government	<u>276</u>	5.4%	<u>212</u>	3.1%
Total Covered Employment	5,083		6,859	

Source: U.S. Census

Places of Work

People who are employed in Duxbury mainly reside in Duxbury or the neighboring towns. Close to one fourth of the work force in the town work in town, while others travel to Boston or other regional centers of employment.

Table 2-7
Top Destinations of Persons Traveling To or From Duxbury for Work in 1990

Town of Residence of Duxbury Employees	# of Persons	%	Workplace of Duxbury Residents	# of Persons	%
Duxbury	1314	44.4	Duxbury	1314	24.4
Plymouth	354	12.0	Boston	1000	18.6
Marshfield	294	9.9	Quincy	325	6.0
Kingston	170	5.7	Plymouth	318	5.9
Pembroke	121	4.1	Braintree	272	5.1

Source: 1990 U.S. Census

Approximately 7% of the labor force in Duxbury worked at home or walked or biked to work in 1990. Approximately 13% traveled 10 minutes or less to work, while 48% traveled less than one half hour by vehicle.

Income Distribution

According to MAPC estimates, the median household income in Duxbury in 1994 was \$77,163. The number of persons in 1989 whose household income was below the poverty level was 259, or approximately 1.9% of the population. The percentage of persons below the poverty level in Duxbury was considerably lower than Plymouth County (4.0%) or Massachusetts (8.9%)

Table 2-8
Income Distribution - 1989

	<u>Households</u>	<u>%</u>
Less than \$10,000	271	5.8
\$10,000 - \$24,999	481	10.4
\$25,000 - \$49,999	940	20.3
\$50,000 - \$99,999	1,954	42.2
\$100,000 or more	997	21.6

Source: U.S. Census

Tax Base

The tax base in Duxbury is primarily residential, with homeowners producing approximately 96% of the tax revenues. Exempt properties constitute 10% of total property value in the town. Industrial and commercial properties combined make up approximately 2% of the taxable property in Duxbury. The Chapter 61, 61A, and 61B tax provisions permit private agricultural, forestry, and recreation lands to be taxed at a lower rate as long as they remain undeveloped. This program is described in greater detail in the Natural and Cultural Resources section. Such lands constitute less than one percent of the total property value in the town.

Table 2-9
Total Property Values in Duxbury by Land Use Category, January 1, 1998

	<u>Total Property Value</u>	<u>% (Excluding Exempt)</u>
Residential	1,447,489,529	95.7
Commercial	34,266,322	2.3
Industrial	668,100	0.0
Personal Property	18,114,280	1.2
Chapter 61, 61A, 61B (Agriculture, Forestry, Recreation)	<u>12,508,700</u>	0.8
Total non-exempt	1,513,046,931	
Exempt (9.8% of Total)	<u>159,665,600</u>	
Total	1,672,712,531	

Source: Town of Duxbury Assessors Department

2.3 ECONOMIC BASE

Recent trends in the MAPC District show a broadening of the regional employment base. Employment in the SSC subregion of MAPC represented 2.9% of employment in the MAPC region, and is expected to increase to 3.8% of employment in the region by 2000. Total employment in the South Shore subregion grew by over 30% from 1980 to 1990, and is expected to reach 49,400 in 2000. Duxbury, itself, is expected to account for approximately 3.5% of employment in the SSC subregion in the year 2000.

The economy in Duxbury has fully recovered from the recession in the early 1990s. The number of establishments in Duxbury fell between 1990 and 1992, but has since regained levels prior to the recession. Employment in Duxbury also declined after a peak in 1988, but has risen modestly in recent years. The structure of the economy has shifted in recent years, as more employment growth has taken place in the service and trade industries.

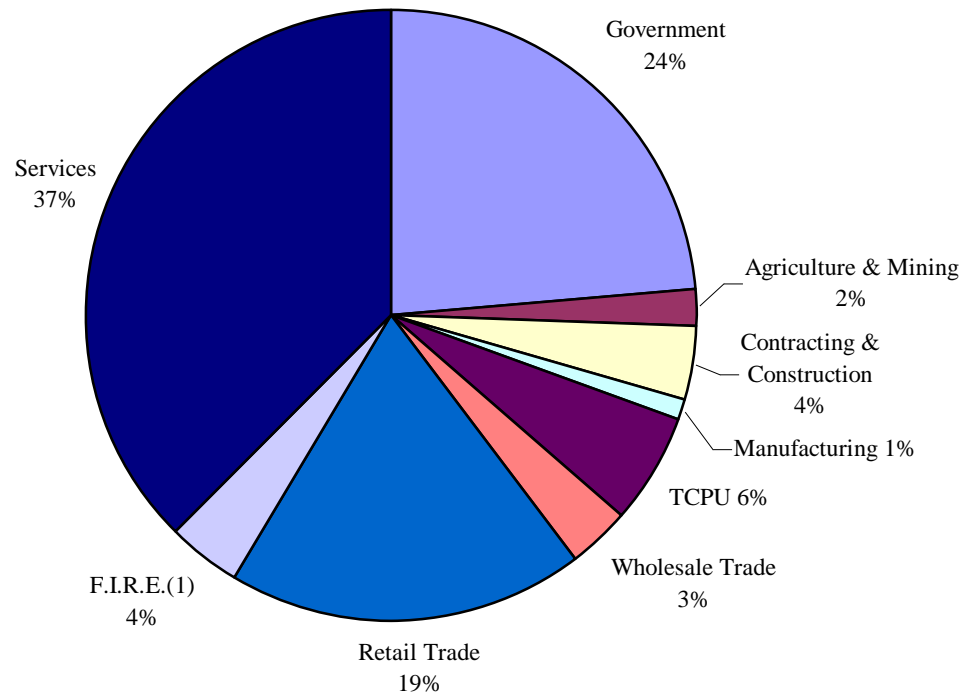
In 1996 a total of 345 businesses in Duxbury employed approximately 2,255 persons. The average annual wage for employees in Duxbury in 1996 was \$28,981. The highest number of jobs was in the services industry (37%), and in the government (24%). A sizable number of jobs, 22%, were in wholesale and retail trade. Employment in the service industry is expected to grow faster than employment in all other industries in the MAPC region as a whole, reaching over 40% of total employment by 2010.

Table 2-10
Employment by Industry in Duxbury

	Average Annual Wage	Number of Establish- ments	Total Employ- ment	Gov.	Agr. & Min.	Contr. Const.	Manu- facturing	Transport Comm. Utilities	Wholes. & Ret. Trade	Finance Insurance Real Estate (F.I.R.E)	Services
1986	\$17,032	295	2,211	551	73	235	51	71	477	85	668
1988	\$19,963	341	2,442	603	85	257	60	72	519	99	758
1990	\$21,742	344	2,256	591	59	171	11	96	482	93	753
1991	\$21,407	305	2,010	572	46	125	10	87	461	87	622
1992	\$22,483	288	1,995	576	47	51	24	127	455	110	605
1993	\$23,671	295	2,031	550	45	62	29	123	444	116	662
1994	\$24,597	317	2,125	549	49	61	33	138	466	129	700
1995	\$26,305	337	2,175	543	45	84	31	117	479	123	753
1996	\$28,981	345	2,255	532	47	84	24	132	504	87	845

Source: Massachusetts Division of Employment and Training (covered employees only)

Figure 2-1
Distribution of Employment in Duxbury (1996)



⁽¹⁾ Finance, Insurance, and Real Estate

Table 2-11
Average Annual Wages by Industry in Duxbury

	<u>1992</u>	<u>1994</u>	<u>1996</u>
Government	\$26,159	\$28,822	\$29,252
Agriculture & Mining	16,674	*	24,059
Contracting & Construction	28,213	38,029	26,714
Manufacturing	22,165	32,942	80,581
Transp., Comm., & Utilities	14,301	27,891	17,991
Wholesale Trade	40,277	39,993	66,199
Retail Trade	14,087	14,202	16,796
Fin., Insurance, & Real Estate (F.I.R.E.)	38,260	28,984	66,199
Services	\$21,254	\$22,175	\$27,898

Source: Massachusetts Division of Employment and Training

* Confidential or not reported to avoid disclosing operations of individual firms or agencies.

Retail Trade

The 1992 U.S. Census of Retail Trade reported that there were 50 retail establishments with total annual sales of \$39,458,000. The largest categories were food stores, with eight stores totaling \$12,233,000 in annual sales. Eating and drinking establishments and apparel and accessories stores were the next largest categories, followed by building materials and garden supplies. Annual sales are not reported by the census for other categories of retail establishments in Duxbury to avoid disclosing the operations of individual companies or businesses. Retail establishments in 1996 employed 428 people at a relatively low average wage of \$16,796. Wholesale establishments employed 76 persons at an average wage of \$66,199.

Table 2-12
Retail Sales by Retail Group (1992)

	<u>Establishments</u>	<u>Sales (\$,000)</u>
Building. materials, garden supplies	5	3,570
General merchandise	1	*
Food Stores	8	12,233
Automotive stores	3	*
Gasoline service stations	5	4,213
Apparel, accessories stores	1	*
Furniture, home furnishings	1	*
Eating & drinking places	14	4,821
Drug & proprietary stores	1	*
Miscellaneous retail stores	11	*

Source: U.S. Retail Census

* Sales withheld where it would disclose the operations of individual companies or businesses.

Manufacturing

Manufacturing is not a significant presence in Duxbury. In 1996 manufacturing enterprises in Duxbury employed a total of 24 persons. The number of persons employed in manufacturing declined in the early 1990's, and has not fully recovered to previous levels. The number of establishments likewise reflects this trend.

The most prominent manufacturing industries in Plymouth County in 1992 both in terms of the number of establishments and the number of employees were printing and publishing with 18.0% of manufacturing jobs, followed by industrial machinery and equipment, with 11.4% of manufacturing jobs in the county. The share of jobs in printing and publishing rose from 16% in 1987, while the share of jobs in manufacturing industrial machinery did not change significantly.

2.4 MARKET AREA CHARACTERISTICS

Location

Duxbury is located in the South Shore subregion of the MAPC district. The town is largely a bedroom community of Boston, although people do commute to the Route 128 corridor and elsewhere. The town of Plymouth is a regional economic center in the South Shore area, with a concentration in tourism activities. Major regional retail centers are located in the towns of Hanover and Kingston, which are emerging as centers of economic growth. Duxbury has good access to regional transportation corridors via Route 3, which crosses through the town.

Market Trends

The office, industrial, and high tech real estate market in the Greater Boston area has been strong in recent quarters, and exceptionally low vacancy rates have diminished options for companies seeking space. Financial services and high technology companies have been the primary engines of economic growth in the region. Many speculative office developments are currently taking place in Boston and along major transportation corridors close to the city. Outlying suburban areas are not likely to see a rise in speculative development, but can still expect to see an increase in construction of new industrial, office, and R&D facilities by individual companies seeking to relocate. Duxbury is not likely to be affected by major increases in industrial and high tech uses because sites of adequate size are not available. Most of Duxbury's nonresidential growth is expected to be triggered by residential needs.

Economic Development

Duxbury is predominantly a residential community and would like to remain so. It has areas zoned for business uses – largely retail and office uses located in commercial areas scattered throughout the town. Figure 2-2, Business Areas, shows where commercial activity is located in the town. The main commercial area is Hall's Corner in South Duxbury, while smaller areas include Cox Corner, Mill Brook, Snug Harbor, Bennett's area (located near Exit 10 to Route 3), and an area on Route 53 west of Route 3 (Kings Town Way), as well as a few other very small areas.

The Comprehensive Plan process has helped to determine what additional level of economic development (if any) is desirable in the town. Possibilities considered included an office park off of Route 3, expansion of retail areas to include specialized retail and neighborhood retail, and possibly some service commercial areas to accommodate contractors yards, wholesale distributors, and auto related uses. They are discussed further under goals and recommendations which follow.

As a predominantly residential town, Duxbury first seeks to preserve the qualities that assure the continuation and enhancement of a high quality living environment. However, there are certain types of nonresidential activities that may be suitable, assuming they can be accommodated without adverse impacts on the residential community. The following groups of goals seek to identify appropriate levels of economic development activity.

2.5 ECONOMIC BASE GOALS AND POLICIES

1. Recognize that large commercial development will have an adverse impact on the rural nature of the community.
2. Manage growth to minimize negative financial impacts from new development.
3. Support and strengthen the kinds of local businesses that are beneficial to the community in terms of providing needed services, products, employment, and tax revenue.
4. Maintain high standards of design, construction, and maintenance in existing and new commercial developments.
5. Coordinate vehicular traffic, pedestrian traffic and parking in commercial areas so that they function in an optimal manner.
6. Encourage limited amounts of office and high technology uses in existing neighborhood business districts that will yield net tax revenues to the town.
7. Seek other desirable land uses (senior assisted living, private schools, etc.) that fit the community and may yield net tax revenues, provided they are not disruptive to the residential community or the environment.

2.6 RECOMMENDATIONS FOR FUTURE ECONOMIC BASE

Primary Recommendations

1. Do not expand NB zones except for a modest expansion of the district in the Bennett's Corner area.
2. Encourage compatible recreational or special residential uses that will yield net tax revenues or that offer a substantial public benefit to the Town provided they are compatible with existing residential uses and the environment.
3. Improve and enforce design review procedures for nonresidential and multifamily uses.
4. Seek to accommodate (with appropriate design controls) shops and garages for small and medium sized trade, service companies, and contractors yards who serve town residents and businesses
5. Review home business provisions of the Zoning Bylaw to ensure consistency with Plan Goals.

Secondary Recommendations

None.

Section 3: NATURAL & CULTURAL RESOURCES

Section 3: NATURAL & CULTURAL RESOURCES

Introduction

Duxbury's attractive landscape of forests, beaches, fields, wetlands, homes, and small village-like commercial nodes gives the town a unique semi-rural character and distinguishes it from many of its more-developed South Shore neighbors. While some of Duxbury's special places and important natural and cultural resources are protected, many are subject to suburban development pressures. These pressures are likely to intensify as the new MBTA Old Colony Railroad facilitates daily commuting from the South Shore to Boston and makes Duxbury a more attractive place to live.

The 1997 Duxbury Open Space and Recreation Plan outlines an ambitious five-year course of action to protect the town's special places and natural resources. This Plan addresses four goals shared by Duxbury's citizens and town officers: protection of Duxbury's drinking water supply; protection and enhancement of natural resources and ecosystems; improvement of recreational opportunities; and preservation of Duxbury's character. To meet these goals, the action plan recommends specific programs of land acquisition, resource assessment and monitoring, public education, and other programs.

The Natural and Cultural Resources section of the Comprehensive Plan uses the 1997 Open Space and Recreation Plan both as a resource for information and as starting-point for conservation goals, strategies, and recommendations. In its recommendations, this section of the Comprehensive Plan pursues the goal expressed in the Comprehensive Plan Scope: "to insure that new development takes place in an ecologically sound manner and that environmentally sensitive areas and cultural and historical areas will be protected."

3.1 EXISTING NATURAL AND CULTURAL RESOURCES, AND PROVISIONS FOR THEIR PROTECTION

This sub-section identifies Duxbury's natural and cultural resources, using information from the 1997 Open Space and Recreation Plan, MassGIS, the Massachusetts Natural Heritage Program, interviews with town officers, and other sources. The Geographic Information System (GIS) maps which supplement this section display the spatial extent of each resource. This section also examines the existing provisions for resource protection, such as conservation lands, conservation easements, and environmental laws.

Open Space

Public and private owners maintain almost 40% of Duxbury's land area as open space: forests, farms, cranberry bogs, wetlands, beaches, parks, and riparian corridors. The Conservation Commission currently owns about 12.6% of the town's land, held in perpetuity for conservation purposes. Much of this land was acquired under the recommendation of the 1969 Duxbury Comprehensive Plan, which suggested that the town acquire large amounts of open space, including cranberry bogs and the Duxbury Salt Marsh, to protect against overdevelopment. Land acquisition virtually ceased in the early 1980s, as new state and local laws limited taxes and spending.

In the last few years, the Conservation Commission has begun a second wave of land acquisition, as recommended in the 1997 Duxbury Open Space and Recreation Plan, which outlines goals and criteria to guide this acquisition. In 1998 the Town acquired 373 acres of conservation land, including 354 acres of the Camp Wing property. The Town allocates an annual budget of approximately \$100,000 to a Conservation Fund that may be used to purchase land or land options, seek property appraisals, and manage existing conservation land. The Conservation Fund is an important complement to Town Meeting-approved property purchases because it may be used at short notice to take advantage of time-sensitive conservation opportunities.

Most of Duxbury's open space is not protected specifically for conservation purposes, but remains undeveloped for other reasons. This includes land owned by the Duxbury Water Department, other town departments, and non-profit and church organizations, as well as "inholdings," or parcels surrounded on all sides by open space. In addition, almost one-third of Duxbury's open space is temporarily protected under Chapters 61, 61A or 61B of the Massachusetts General Laws. Under these laws, property owners receive tax credits for retaining their land in forestry, agricultural or recreational uses, respectively, rather than selling or developing this land.

Chapter 61 is designed to keep forested land under productive forest management. Owners with more than 10 acres of forest are eligible for enrollment. They must submit a Department of Environmental Management (DEM) approved forest management plan and a management certificate to the town assessor for a new tax classification to begin. The assessment of land classified under Chapter 61 is reduced by 95%. The loss of taxes to the town is partially offset by a yield tax of 8% that the owner pays on the value of wood harvested from the land annually.

Chapter 61 classifications run for ten year periods. An owner who wishes to sell land classified under Chapter 61 for a different use during the first ten years of certification must repay all back taxes to the town, plus interest, minus payments made for the 8% yield tax. The town has a 120-day right of first refusal to purchase the land if it can match the price offered to the landowner. The town may also transfer the right of first refusal to a non-profit conservation organization.

Chapter 61A is most commonly applied to agricultural or horticultural land but can be used for the forested portions of a farm, provided a forest management plan is approved by the Massachusetts Department of Environmental Management. To qualify for Chapter 61A, a farm owner must have five or more contiguous acres being used for agricultural or horticultural purposes. This land must produce annual gross sales of not less than \$500.00. For each additional acre over five, the minimum produce value is \$5.00. There is no product value for woodlands and wetlands, for which the added value is \$0.50 per acre. Property under Chapter 61A is assessed at rates that vary for different agricultural uses. Generally, classification will result in a reduction of 80% in assessed value.

Chapter 61B is similar to 61A, but applies to lands designated for recreational use, containing at least five contiguous acres. The land must be retained in a natural state to preserve wildlife and natural resources, must be devoted primarily to recreational use, and must provide a public benefit. Recreational uses eligible for Chapter 61B include hiking, camping, nature study, shooting/target practice, hunting, and skiing. The assessed valuation of Chapter 61B land is reduced by approximately 75%.

Towns often have difficulty taking advantage of the right of first refusal, because they must have available a large cash reserve to buy the land, as well as a political structure that can quickly approve the purchase.

The Duxbury Conservation Commission is responsible for implementing and enforcing local and state environmental regulations, and may use these laws as an effective and inexpensive tool to preserve wetlands, floodplains, rare species' habitat, and areas with porous soils or high groundwater. Though inexpensive, this form of open space protection is less certain than acquisition in the long term, since environmental laws are subject to change.

Table 3-1 summarizes open space holdings in Duxbury according to ownership and degree of protection. Appendix 3-1, an index of conservation lands from the 1997 Duxbury Open Space and Recreation Plan, itemizes this information by parcel, address, and acreage. Figure 3-1, *Existing Open Space* classifies Duxbury's open space according to degree of protection. Classification of open space lands on this map is as follows:

- **Protected in Perpetuity:** This category includes Town lands designated for conservation, State lands designated for conservation, and lands held by non-profit conservation organizations.
- **Protected Temporarily:** This category includes Chapter 61, 61A, and 61B lands, and certain Town lands not designated for conservation.
- **Limited Protection:** This category includes most Town lands not designated for conservation (e.g. School Department and DPW lands), and certain lands held by non-profit organizations other than conservation organizations.
- **No Protection:** This category includes inholdings and certain lands held by non-profit organizations other than conservation organizations.
- **Unknown:** This category includes certain Town-owned lands (such as tax title properties) and certain lands held by non-profit organizations other than conservation organizations.

Table 3-1
Open Space in Duxbury, Classified According to Ownership and Degree of Protection.

Ownership	Acres (% of town)	Protection Status
Duxbury Conservation Commission	1,945 (12.6%)	Protected
Non-profit land preservation organizations	457 (3.0%)	Protected
Commonwealth of Massachusetts	29 (0.2%)	Protected
Duxbury Water Department	193 (1.2%)	Protected
Duxbury Rural & Historical Society	146 (0.9%)	Protected
Other town land (School Dept., Recreation Dept., others)	1,037 (6.7%)	Limited protection: public ownership, but no legal restrictions on land use.
Church & Non-profit organizations (excluding non-profit land preservation organizations)	321 (2.1%)	Not protected
Private: held in Chapter 61 for forestry	801 (5.2%)	Temporarily protected
Private: held in Chapter 61A for agriculture	965 (6.2%)	Temporarily protected
Private: held in Chapter 61B for recreation	200 (1.3%)	Temporarily protected
Total	6,094 (39.4%)	17.9% protected 21.5% unprotected or semi-protected

Sources: MassGIS; 1997 Duxbury Open Space and Recreation Plan; Duxbury Planning Department.

Groundwater Resources

Duxbury contains two main types of geological deposits. Stratified drift deposits are porous, transmit groundwater, and comprise Duxbury's several thin aquifers. Till deposits are relatively packed, transmit groundwater poorly, and serve as the boundaries between aquifers. Groundwater recharge occurs primarily through stratified drift formations and through freshwater wetlands.

Duxbury's groundwater is the sole public source of drinking water in the town, and is supplied by ten drinking water wells, shown on Figure 3-3, *Water Resources*. Duxbury's largest aquifer underlies North Hill Marsh in north-central Duxbury. Since this primary aquifer is wholly confined within the town, any groundwater pollution resulting from unwise land use in Duxbury will directly impact drinking water quality. The porous nature of the overlying soils makes the town's aquifers especially susceptible to pollution, drought, and saltwater intrusion. In Duxbury, nonpoint-source pollutants, such as road salt, septic wastes, lawn and garden chemicals, and household chemicals, pose the greatest threat to groundwater quality.

The Massachusetts State Environmental Code, Title "5", and the Duxbury Supplementary Rules and Regulations, control the placement of on-site sewage disposal systems for new development. Soils that are too porous or too impermeable are unsuitable for septic tanks, as are areas of high groundwater. One or more of these conditions occur on much of Duxbury's undeveloped land, essentially limiting where new development may occur. Figure 3-2, *Constraints on Development*, Title "5" (310 CMR State Environmental Code), identifies areas of severe and very severe septic limitation due to unsuitable soils.

The Duxbury Zoning Bylaws (see Duxbury Zoning Bylaws, Article 406, 1997) regulate activity in Zone II Aquifer Protection Districts, shown on Figure 3-3. (Zone II districts are the areas of

land determined to recharge directly into aquifers used for drinking water supply.) These laws prohibit noxious uses, limit residential dwellings to one unit per acre, and prohibit golf courses, cluster developments, and the use of hazardous materials, except by special permit.

Freshwater Rivers, Ponds, and Watersheds,

The 1997 Open Space and Recreation Plan groups Duxbury's ponds and rivers into six watershed systems: the South River, Green Harbor River, Back River, Island Creek, Jones River, and Bluefish River watersheds. A watershed is defined as the area of land that drains into a particular water body. Duxbury's six watersheds provide important habitat for birds, fish, and mammals, as well as scenic and recreational value for humans. The Five-Year Action Plan in the 1997 Duxbury Open Space and Recreation Plan recommends that Duxbury's watersheds serve as the centerpiece of a network of conservation lands and greenways.

The Massachusetts Rivers Protection Act of 1996 and the Town of Duxbury Wetlands Regulations restrict development within 200 feet of perennial rivers and streams. However, the upland region beyond this 200 foot buffer also plays an important ecological role by serving as the recharge area for rivers; by providing a complementary habitat for riparian species requiring upland resources; and by allowing riparian corridors to serve as effective migration corridors for species requiring larger areas habitat. Currently, Duxbury's riparian corridors are primarily undeveloped, but much of this land is semi-protected or unprotected.

Duxbury contains several relatively small, shallow ponds, some of which are currently experiencing eutrophication (elevated levels of the plant nutrients nitrogen and phosphorus) and associated weed infestation. Eutrophication in Duxbury is the result of nonpoint-source pollution from agricultural chemicals (for example, from cranberry bogs), street runoff, septic systems, and lawn and household chemicals. Duxbury's ponds are especially prone to elevated nutrient levels because the Town's porous soils readily transmit pollution and because the ponds are shallow and incapable of buffering pollution loads. Remediation of weed and nutrient problems is ongoing at Island Creek Pond, Garside Reservoir, and Lower Chandler Mill Pond through a combination of techniques including weed harvesting, planting of native aquatic species, and chemical treatment. Homeowners' groups also play an important role by educating lakeshore residents on how to reduce nonpoint source pollution from their property.

Table 3-2 summarizes important qualities of Duxbury's six watersheds. Additional information is available in the 1997 Duxbury Open Space and Recreation Plan.

Table 3-2
Important Characteristics and Current Protection Status of Duxbury's Six Watersheds

<u>Watershed</u>	<u>Valuable resources</u>	<u>Protection Status</u>
South River (Northwest Duxbury)	<ul style="list-style-type: none"> • High-quality fish & wildlife habitat • MA Natural Heritage Exemplary Natural Community 	Contains many large open tracts where development pressures are increasing. Portions of Camp Wing were recently acquired; others are still unprotected.
Green Harbor River (North Duxbury)	<ul style="list-style-type: none"> • Aquifer protection district for Marshfield & Duxbury wells • High-quality fish & wildlife habitat 	Contains some medium-sized open tracts where development pressures are increasing; opportunity for protection
Back River (From North Hill Marsh East to Duxbury Marsh)	<ul style="list-style-type: none"> • Shellfish harvesting area near mouth • Recreation use in North Hill Marsh area 	North Hill Marsh is largely protected. Lower stretches contain low-density residential, with limited opportunity for protection
Island Creek (southeast Duxbury)	<ul style="list-style-type: none"> • Island Creek Pond: fishing & boating • Anadromous fish run, with fish ladder* 	Lower portion of the watershed contains significant development. Upper portion includes conservation lands, with potential to protect additional land around Island Creek Pond.
Jones River (Southern Duxbury)	<ul style="list-style-type: none"> • Aquifer protection district for Kingston • Lower part of watershed, is an MA Natural Heritage Exemplary Natural Community 	Almost completely unprotected. Some land is in Chapter 61A (agricultural use).
Bluefish River (Eastern Duxbury)	<ul style="list-style-type: none"> • Anadromous fish run, with fish ladder* • Headwaters in Aquifer Protection District 	Much of the watershed is semi-protected, in municipal and non-profit ownership. Past pollution problems from ineffective septic systems have been corrected.

Source: 1997 Duxbury Open Space and Recreation Plan.

* Note: Both Island Creek and Bluefish River support alewife fish runs, according to the Duxbury Conservation Administrator. The Island Creek fish ladder is Town owned, and is planned for repair in the upcoming years. The Bluefish River fish ladder is privately owned.

Wetlands

Wetlands are areas characterized by standing water, hydric soils, and/or water-tolerant vegetation, and typically occur along the shorelines of ponds, streams, and the ocean, as well as in isolated depressions in upland areas. Wetlands provide several benefits both to humans and to ecological communities. Important wetland functions regulated under the Massachusetts Wetlands Protection Act including the following:

- **Pollution Control:** Vegetated wetlands remove or detain sediments, nutrients (such as nitrogen and phosphorus), and toxic substances (such as heavy metals) that are found in run-off and flood waters.
- **Flood Control:** Vegetated wetlands temporarily store flood waters, allowing some evaporation and slowing the release of flood waters to downstream areas.
- **Storm Damage Prevention:** The reduction of the quantity and flow of flood waters lessens damage to private and public property.
- **Wildlife Habitat:** The hydrologic regime, plant communities, soils, topography and water chemistry of vegetated wetlands provide food, shelter, migratory, overwintering and breeding areas for many birds, mammals, amphibians and reptiles. Thirty-five percent of plants and animals that are listed as endangered or threatened in the United States live in wetlands or depend upon them for survival.
- **Fisheries:** Vegetated wetlands provide habitat for insects and aquatic invertebrates, which are an important source of food for fish.
- **Ground Water Supply:** Some vegetated wetlands discharge ground water to the surface. Wetlands also aid in maintaining base flow levels in rivers and streams and filter and clean surface water as it percolates into the groundwater.
- **Public and Private Water Supply:** Vegetated wetlands help maintain high-quality groundwater, a primary source of drinking water in many communities including Duxbury.

Another benefit of wetlands not discussed in the Wetland Protection Act is:

- **Passive Recreation:** Vegetated wetlands provide opportunities for nature study, photography, bird-watching, and other recreational uses.

Duxbury has approximately 1,165 acres of freshwater wetlands, marshes, and swamps; 425 acres of freshwater ponds; and 370 acres of cranberry bogs.

The Massachusetts Wetlands Protection Act restricts activity within 100 feet of wetlands and other water bodies. The Duxbury Conservation Commission administers this law locally, and considers applications for activities in wetland zones. Generally wetland alteration is allowed only in small areas when there are no feasible alternatives, and is subject to the condition that an equivalent amount of wetland must be replicated elsewhere. In wetland buffer zones, work is often allowed subject to an Order of Conditions from the Conservation Commission. Although the Conservation Commission has some discretion in deciding how much development to allow

in wetlands and buffer zones, the MA Department of Environmental Protection has the authority to override any Conservation Commission decision.

The Duxbury Zoning Bylaws and Wetland Regulations further protect wetlands within Wetlands Protection Districts (Duxbury Zoning Bylaws, Article 403, 1997). In these districts, which include both isolated wetlands and wetlands bordering other water bodies, alteration of land is prohibited except by special permit. The Duxbury Wetlands Protection Districts include a small amount of land outside of the Massachusetts Wetlands Protection Act jurisdiction, and vice versa.

Beaches, Saltwater Wetlands, and Coastal Resources

Duxbury Beach, Duxbury Bay, and Duxbury Salt Marsh provide important recreational and ecological services. All three are currently protected from development. Duxbury Beach is a 4½ mile long barrier beach, a long, narrow strip of sand separated from the mainland by Duxbury Bay. As a result of tides, storms, and wind action, barrier beaches are constantly changing. Typically the beach erodes in the winter, when large storms remove sand, and accrete in the summer, when lower-energy waves return sand from offshore areas. Barrier beaches also protect the mainland from the ravages of winter storms by intercepting large waves and dispersing their energy.

In the summer of 1999, Duxbury saw unprecedented crowds on the “drive on” portion of Duxbury Beach. The significant increase in activity was caused by several factors; a hot summer, the growing popularity of 4 wheel-drive vehicles, the prohibition of 4 wheel-drive vehicles on beaches in neighboring Towns and an increase in the purchase of oversand beach permits, 8% by Duxbury residents and 23% by non-residents. The Board of Selectmen formed a committee to study the overcrowding, the use of 4 wheel-drive vehicles on the beach and the policies regarding the distribution of oversand permits.

Duxbury Beach supports a dune community typical of Massachusetts’s coastal areas. The beach is a breeding ground for three rare bird species—the least tern, the arctic tern, and the piping plover—and an important feeding and resting area for many bird species migrating on the eastern flyway. The Massachusetts Natural Heritage Program considers the beach a “high priority site for protection.”

Duxbury Beach Reservation, Inc., owns the beach and leases it to the town on an annual basis. The Town and Duxbury Beach Reservation, Inc. jointly provide beach management and law enforcement services. The beach is currently being managed under the 1997 Duxbury Beach Management Plan, prepared by the Town of Duxbury Beach Committee. Current management activities include:

- Duxbury Beach Reservation’s program of beach grass and shrub planting to enhance dune stability and provide greater habitat diversity for threatened species.
- Enforcement of the Duxbury Beach Rules and Regulations to restrict pets, trash disposal, removal of natural material from the beach, bonfires, camping, and other activities.
- Town of Duxbury beach patrols daily from 6AM to 2AM in the summer, with shorter hours in other seasons.

- Restrictions on off-road vehicle use, including a limit of 500 vehicles at any one time on the beach.

Other recommendations of the Duxbury Beach Management Plan concerning wildlife, plant communities, off-road vehicles, and dunes are discussed below in the Recommendations and Options section of this chapter.

The mudflats and shoreline of Duxbury Bay support some of the most important commercial and recreational shellfisheries in southeastern Massachusetts, as well as commercial lobstering and finfishing. While the Duxbury Bay environment is generally clean, the Shellfish Warden reports localized seasonal contamination, typically from sewage wastes.

The 1000-acre Duxbury Salt Marsh is an important component of Duxbury's marine ecosystem, providing food and habitat for invertebrates, fish, birds, and mammals. The town owns part of this marsh, and state wetland laws currently protect the entire marsh. In other coastal areas, the Duxbury Wetland Regulations restricts activity within 100 feet of the ocean and within 100 feet of land subject to tidal and wave action, such as beaches, dunes, and salt marshes.

Wildlife Habitat and Rare and Regionally Important Species and Habitats

Duxbury's matrix of forests, fields, water bodies, and edge zones provides habitat for a variety of mammals and birds, including raccoon, fox, rabbit, deer, ruffed grouse, quail, turkey, red-tailed hawk, and great horned owl. The suburbanization of Duxbury insures that there is and will continue to be plenty of edge habitat where two or more land use types abut—habitat useful for common species such as rabbit, squirrel, ruffed grouse, and quail. However, most of Duxbury's large, unfragmented parcels of wildlife habitat are currently unprotected. Duxbury's less common mammals, such as fox, as well as its rare turtle and salamander species, require these larger parcels, and are threatened by roads, houses, and other forms of habitat fragmentation.

Three regions in Duxbury provide habitat for rare species and play an especially important role in regional ecology:

- **South River Watershed:** The Massachusetts Natural Heritage Program designates much of this watershed as a high priority site for protection of rare species habitats and exemplary natural communities, providing habitat for fish, mammals, and migratory waterfowl. This watershed is very sparsely developed at present, but is partially unprotected and subject to increasing development pressure.
- **Wetlands and Vernal Pools:** The Natural Heritage Program has identified several wetlands and vernal pools as rare and important habitat, including parts of the North Hill Marsh District to the east and west of Route 3 and part of the South River Watershed. Wetlands and vernal pools provide habitat for rare amphibians, including the Eastern box turtle, spotted turtle, and four-toed salamander, and to birds including the American bittern. The Duxbury Wetland Regulations protect vernal pools (whether or not they are certified by Natural Heritage). However, many species that utilize vernal pools and wetlands also require adjacent upland for a viable habitat, and the law does not protect these upland areas.

- **Duxbury Beach:** Duxbury Beach provides breeding habitat for the piping plover, a threatened species at both the federal and state levels, and habitat for the least and arctic terns, both Species of Special Concern in Massachusetts.

3.2 EXISTING CULTURAL AND HISTORICAL RESOURCES, AND PROVISIONS FOR THEIR PROTECTION

Duxbury is rich in heritage: historic houses, sites, and artifacts recount the town's long and interesting history. In spite of this wealth of history, there are no designated historic districts in Duxbury to protect these resources. For a town of its size, Duxbury also possesses a wide variety of cultural attractions, including museums and libraries.

A Brief History of the Town of Duxbury

Adapted from the 1997 Open Space and Recreation Plan

Incorporated in 1637, Duxbury is one of Massachusetts' oldest communities. Its earliest inhabitants were Pilgrims who moved from Plymouth Colony to establish homesteads. Two of the earliest settlers—John Alden and Myles Standish—are remembered today by their historic homes and gravesites.

By the beginning of the eighteenth century, shipbuilding and fishing had become major enterprises in Duxbury. Because of the area's abundant timber supplies and sheltered harbors, ships could be constructed at lower costs than in England. Ezra Weston, known in Duxbury as "King Caesar," was a prominent shipbuilder and sea merchant who established a large shipbuilding yard on Powder Point. His home still stands and is maintained as a museum. As ships grew larger with deeper drafts, the shallow waters of Duxbury Bay could no longer accommodate them, and the master shipbuilders and workers began to move from the area. The decline in the shipbuilding industry caused a significant downturn in the local economy by the mid-1800s.

The railroad came to Duxbury in 1871, bringing with it non-resident "summer people" from Boston who sought Duxbury's cool oceanfront amenities. This influx of tourists altered Duxbury's demographics and town character, and the town increasingly became a seaside community where people came to "summer" in their cottages. The railroad also employed many townspeople and facilitated the transport of commodities to major markets in Boston. As a result Duxbury's economy began to shift from shipbuilding to agriculture, including the harvesting of Duxbury's many lowland cranberry bogs.

In 1963, the completion of Route 3 changed Duxbury's complexion once again. While still maintaining a summer ambience, the town became a year-round home for people working in and around Boston. Summer cottages were weatherized and became year round homes. Today, Duxbury has become a commuting bedroom community, or exurb, of Boston. Town services and schools have been upgraded to meet the increasing year-round demand for services. Duxbury's zoning bylaws allow for a diversity of housing types, but excluded industry and extensively limit commercial development. This zoning encouraged a pattern of residential areas clustered around small commercial "village centers." Since the 1970s, land and home prices in Duxbury have increased dramatically. The Duxbury population today is well educated and economically advantaged.

In late 1997, the MBTA began service from Boston to the South Shore along the Old Colony commuter rail line. Although there are no rail stations in Duxbury, new commuter stations and commuter parking lots in surrounding towns such as Kingston are likely to increase growth pressures in Duxbury. Duxbury may therefore be on the verge of yet another transformation.

Inventory of Historic Resources

Duxbury is rich in heritage, as evidenced by its brief history retold above. Much of this history is reflected in still-remaining houses, sites, and artifacts that are designated Historic Sites. In spite of this wealth of history, there are no designated Historic Districts in Duxbury to provide protections to these properties.

Duxbury's most important historic and cultural sites are listed below.

- John Alden House, Alden St. This house is a museum containing artifacts of the Alden family, who were among Duxbury's original Pilgrim settlers.
- Myles Standish Homestead/Cellar Hole, Marshall St., Standish Shore. This site overlooking Plymouth Harbor is the historic homestead of one of Duxbury's most prominent founders.
- John Alden, Priscilla Mullin, and Elder Brewster gravesites. Burial site for some of Duxbury's earliest settlers.
- Gershom Bradford House, Drew House, and King Caesar House. These three historic house museums are operated and maintained by the Duxbury Rural and Historical Society. Together, they recall Duxbury's shipbuilding era in the mid-1800s.
- Cable House, Duxbury Beach. This privately owned house was the site, in 1869, of the first transcontinental cable connecting the U.S. to France.
- Cushman House. This house contains a memorial room with exhibits of Captain Cushman's artifacts and memorabilia. The Wild Lands Trust of Southeastern Massachusetts owns the house.

Inventory of Cultural Resources

Duxbury's major cultural attractions include:

- Art Museum, Alden St. This museum features an extensive research library, a Japanese tea house and garden, and rotating art exhibits. It is free and open to the public.
- New Duxbury Free Library. This new town public library recently opened in the renovated former Alden Upper School building.
- Ellen Bumpus Gallery. Located in the former Duxbury Free Library, this gallery showcases local artists on a rotating basis. The building itself is a historic structure donated to the town in the late 1800s.

- Ellison Center for the Arts/South Shore Conservatory of Music. South Shore Conservatory of Music recently created the Ellison Center in the former Holy Family Church, Duxbury's first Catholic church. Lectures and concert series will be offered here throughout the year.

3.3 NATURAL AND CULTURAL RESOURCES GOALS AND POLICIES

Recent surveys of Duxbury residents and Duxbury Town boards, committees, and officers indicate general consensus concerning natural and cultural resource management. For the most part, Duxbury values its rural character, open space, high-quality drinking water, and freshwater and saltwater resources. The Goals and Objectives section of the 1997 Duxbury Open Space and Recreation Plan reflects many of these concerns. This section of the Comprehensive Plan builds on the goals expressed in earlier documents, but focuses more closely on natural resource issues. It is intended to complement the Goals and Objectives in the 1997 Duxbury Open Space and Recreation Plan, which focus primarily on open space, town character, and drinking water issues.

In December 1995, the Town of Duxbury mailed a ten-page questionnaire to 9,047 registered voters in the town. The 2,375 people who returned this questionnaire identified open space and natural resources as top concerns in Duxbury, and most indicated that they wanted to see these resources preserved and expanded where possible. Specifically:

- In response to the question "What do you like most about living in Duxbury?" the top three answers were Ambiance, Beach/Water, and Nature.
- When asked to name the top three issues facing Duxbury, Schools and Taxes/Spending were mentioned most frequently. However, all of the other top issues related to land use and natural resources. In order of perceived importance, these included: Growth, Zoning, Environment, Water, Beach, Sewage.
- A large majority of residents were concerned with several environmental issues: Water use & purity (87%), Duxbury Beach (85%), and Environmental Protection (80%). 86% agreed that Duxbury should develop an on-going plan to manage and maintain open space (only 5% disagreed). 64% of residents wanted the town to pursue the purchase of additional open space as it becomes available (16% did not).
- Residents were very concerned about water supply and water quality. 61% thought that there are problems with town water (24% disagreed). To rectify these problems, 66% were willing to reduce their water use (22% were not), 60% favored a water filtration system (23% did not), and 67% said that the town should purchase developable land to preserve it for aquifer protection purposes (10% disagreed).

The 1997 Duxbury Open Space and Recreation Plan distilled these questionnaire responses, plus input from Duxbury town boards, committees, and officials, into four general goals:

- 1) Protection of the Town's drinking water supply.

- 2) Protection and enhancement of Duxbury's natural resources and ecosystems.
- 3) Improvement of Town recreational opportunities with minimum impact to the environment.
- 4) Preservation of the character of Duxbury.

The Plan then elaborated on these broad goals by proposing specific actions and strategies, such as public education programs, planning efforts, and financial commitments.

The following paragraphs describe six categories of goals: open space, groundwater and drinking water, freshwater resources, beaches and saltwater resources, wildlife and rare species, and cultural and historical resources.

1. Open Space

- Expand Duxbury's open space holdings.
- Where possible, increase the level of protection on unprotected and semi-protected open space parcels.
- Explore innovative mechanisms to fund open space protection, such as Transfer of Development Rights programs.

2. Groundwater and Drinking Water

- Identify and reduce the major sources of aquifer contamination, including lawn chemicals and failing septic systems.
- Expand the town's aquifer protection holdings around existing and proposed future well sites where necessary.

3. Freshwater Resources

- Safeguard Duxbury's freshwater wetlands from development.
- Implement a "watershed approach" to freshwater resource management.
- Manage water quality through monitoring programs.
- Educate the public on the importance of maintaining clean water, and on how individual homeowners can promote this goal.

4. Beaches and Saltwater Resources

- Manage Duxbury's beach to provide for both recreational and rare species uses.
- Safeguard Duxbury Marsh from development.

5. Wildlife and Rare Species

- Maintain viable populations of state and federally listed rare and endangered species in Duxbury.
- Maintain viable populations of all other native species.

6. Cultural and Historic Resources

- Protect Duxbury's historic buildings from demolition or inappropriate alteration.
- Identify and implement historic districts in appropriate areas.
- Maintain the general architectural consistency and visual character of Duxbury's built environment.
- Enforce the demolition delay bylaw.

In many towns, the range of public opinion concerning open space and resource preservation would justify the presentation of alternative resource management scenarios in the Comprehensive Plan. In Duxbury, where there is overwhelming public sentiment that the town should remain a rural, wooded community dedicated to environmental protection, this approach appears to be inappropriate. Instead, a single resource management program is recommended, based largely on the opinions of Town citizens and officers, expressed in written surveys and at meetings. This program emphasizes open space preservation, environmental protection, and historic small-town character. In cases where public sentiment is divided, unknown, or in opposition to important resource management objectives, a variety of options are presented.

3.4 RECOMMENDATIONS FOR FUTURE NATURAL AND CULTURAL RESOURCES

Primary Recommendations

1. Identify parcels for open space acquisition in accordance with criteria listed in the 1997 Open Space and Recreation Plan.
2. Further limit the uses allowed in the Aquifer Protection Overlay District and examine the need for additional land protection around existing and potential future Town Well sites.
3. Initiate a water quality monitoring program on Duxbury's major streams and watershed.
4. Consider designating historic parts of the Town as Local Historic Districts or as National Register Historic Districts.
5. Develop a management plan for open space lands acquired by the Town.

Secondary Recommendations

1. Seek open space linkages through a variety of mechanisms, including open space purchases, donation linear easements, cooperation with subdivision developers, and utilization of the Massachusetts Rivers Protection Act.
2. Identify and certify vernal pools in Duxbury.
3. Examine the possibility of utilizing Transfer of Development Rights (TDR).
4. Continue implementation of the Duxbury Beach Management Plan as adopted in 1997 by the Town of Duxbury Beach Committee.
5. Continue implementation of the recently adopted Demolition Delay Bylaw so as to discourage the demolition of historically significant structures.

Appendix 3-1
Inventory of Conservation & Open Space Lands in Duxbury

See information in the Duxbury Open Space Plan and Article 17 of ATM 1999

Appendix 3-2 The Process of Protecting Historic Resources

As mentioned above, although Duxbury possesses a wealth of historic places and resources, it has not designated any places as an historic district. In Duxbury, the protection of historic and cultural resources has traditionally been accomplished by private historic preservation societies such as the Duxbury Rural and Historical Society, non-profit conservation land trusts, and by private deed restrictions or easements. In the past, Duxbury has considered the establishment of historic districts; however, sufficient support was not mustered to implement them. Should Duxbury wish to explore the establishment of historic districts in the future, below is described the nature of historic districts and the process of establishing them. Historic Districts may be established at the federal, state or local levels. Each provides varying degrees of protection. Local Historic Districts can provide the greatest protections to historic properties. National Register properties and State Register properties provide more limited protections. Privately deeded restrictions or easements can provide the greatest protections, but must be either privately donated or directly purchased.

Local Historic Preservation Programs and Districts

The Massachusetts Historical Commission (MHC) was established in 1963 to identify, evaluate and protect important historical and archaeological assets of the Commonwealth. The MHC is the office of the State Historic Preservation Officer and the office of State Archaeologist. The MHC works closely with local preservation groups and, if one has been established, the Local Historic Commission (LHC), which must be established by vote of the town.

As the State Historic Preservation Office, the MHC acts as liaison to federal, state, and local development agencies. The MHC is authorized by state and federal law, through its environmental review processes, to review and comment on certain state and federally licensed or funded projects (i.e. the Old Colony Rail Line or the widening of Route 3) that have an impact on historic properties.

Local Historical Commission (LHC): Once established, the LHC is the municipal agency responsible for ensuring that preservation concerns are considered in community planning and development decisions. They serve as local preservation advocates and as an important resource of information about their community's cultural resources and preservation activities.

Local Historic Districts (LHD): An LHD is established and administered by a community to protect the distinctive characteristics of important areas and to encourage new construction that is compatible with the historic setting. A District Study Committee is appointed to conduct a survey of the area and to prepare a preliminary report for state and local review. A final report is then submitted to the local governing body for approval of the local ordinance. Once the LHD is established, a Local Historic District Commission (LHDC) is appointed to review all applications for exterior changes to buildings within the district.

This design review process assures that proposed changes to properties will not destroy the district's character. Review criteria, which may be either quite restrictive or quite flexible, are determined locally by each town and city and vary considerably for each local district. Therefore, it remains the decision of the town as to the degree of discretion given to the LHDC to review proposed exterior property changes.

National Register of Historic Places

The National Register of Historic Places (NRHP) documents and records the nation's significant buildings, sites, and objects as well as districts worthy of protection. Based on local and state surveys, nominations to the NRHP are generally initiated by the Local Historical Commission, which works with MHC staff to prepare the nomination form. The MHC then reviews nominations. State Review Board at a public meeting and forwarded to the Keeper of the National Register for approval.

Listing on the NRHP provides a basis for making informed planning and development decisions. NRHP status places no constraints on what owners may do with their properties when using private funds. While the NRHP is not a design review program, it does provide limited protection from state and federal actions, as well as eligibility for matching state and federal restoration and research grants and certain federal tax benefits for certified rehabilitation projects.

State Register of Historic Places

The State Register of Historic Places (SRHP) was created to serve as a master list of designated historic properties in Massachusetts and to provide an added measure of protection to these properties. Properties are included on this Register if they are: listed or determined to be determined eligible for listing in the NRHP; local historic districts; local, state and national landmarks, state archaeological landmarks; or properties with preservation restrictions. The State Register serves as a guide for project developers to determine whether a state funded or licensed project will affect any historic properties. The State Register review process is modeled closely after the federal review process and ensures that State Registered properties will not inadvertently be harmed by activities supported by State agencies.

Preservation Restrictions

Preservation Restrictions protect historic properties from changes that may be inappropriate. A preservation restriction (easement) on a property restricts present and future owners from altering a specified portion of a building, structure or site. A restriction can run for several years or in perpetuity and may be included as part of a property deed. Preservation restrictions can be donated or purchased by a government body, or private preservation organization and are enforced by the holder of the restriction. Charitable donations of easements on historical buildings or archaeological sites may qualify for federal income tax deductions.

Appendix 3-3

Natural And Cultural Resource Protection Tools Available To Duxbury

Adequate protection of Duxbury's natural and cultural resources will require the use of a variety of tools, including state and local environmental regulations, self-help grants, technical assistance programs, and other tools. In 1996, Massachusetts passed a \$400 million Open Space Bond Bill, providing \$50 million to replenish the Self-Help and Urban Self-Help grant programs. The following list describes some of the important resource protection tools available to Duxbury.

State and Local Regulations

- **Massachusetts Environmental Policy Act.** The MEPA review process requires the proponents of large projects to examine and mitigate the environmental impacts of their projects. The Town of Duxbury may influence this process by submitting comments on projects proposed in Duxbury.
- **Massachusetts Wetlands Protection Act and Rivers Protection Act.** The Duxbury Conservation Commission and the DEP administer these state regulations. The Commission has some discretion to determine whether activities (such as the construction of houses, septic systems, and roads) are permitted in wetlands and the 100 foot buffer zones around wetlands, and within 200 feet of perennial streams.
- **Areas of Critical Environmental Concern.** Designated and administered by the Department of Environmental Management, ACECs are intended to protect natural resources of regional importance, which often span two or more municipalities. Local citizen or government groups may petition the DEM for inclusion in the ACEC program of an outstanding natural resource in their area. Once designated, an ACEC provides additional protection against development. In Duxbury, several of the watersheds, as well as the salt marsh, might be reasonable candidates for ACEC designation.
- **Massachusetts Endangered Species Acts.** This Act, administered through the Duxbury Conservation Commission, allows for review by the Natural Heritage and Endangered Species Program of projects proposed within designated habitat areas.

Self-Help Grants

- **Massachusetts Self-Help Program.** This program provides up to 90% reimbursement for the cost of land purchase for conservation or passive outdoor recreation purposes. Projects that are successful typically protect water resources, include rare or endangered species habitat, link to other protected open space, or contain historic or archaeological resources, and include participation with other governmental or private non-profit agencies. Annual filing deadline is June 1. Contact the Division of Conservation Services at 617-727-1552.
- **Massachusetts Urban Self-Help Program.** This program provides up to 90% reimbursement for the cost of purchasing and/or developing land for recreational uses, including ballfields, golf courses, playgrounds, and other facilities. Successful acquisition projects typically provide water based recreation, link protected open space, protect rare or endangered species habitat, or protect cultural or archaeological sites. Cooperation with other governmental and nonprofit agencies is encouraged. Only municipalities with a park, playground, or recreation commission are eligible. Annual filing deadline is June 1. Contact the Division of Conservation Services at 617-727-1552.
- **Coastal Access Grant Program.** This program supports local efforts to enhance the public's ability to access the shoreline. Grants range from \$1,000 to \$3,000. Contact the DEM at 617-727-3180.

- **Greenways and Trails Demonstration Grants Program.** The DEM provides grants of \$1,000 to \$3,000 to municipalities and non-profits to support innovative projects which advance the creation and promotion of greenway and trail networks in Massachusetts.
- **Lake and Pond Grant Program.** This program provides grants for comprehensive, integrated approaches to lake management, protection, and restoration. A maximum grant of \$10,000 is available on a 50/50 cost sharing basis. Annual application deadline is in November or December. Contact the DEM, Office of Water Resources, at 617-727-3267.
- **National Recreational Trails Act Grant Program.** These grants provide funding for trail projects to private organizations and municipalities. Contact the DEM at 617-727-3180.
- **Forest Stewardship Program.** This program provides incentives for sound forest management on private lands. Landowners, with the assistance of DEM foresters, develop a forest stewardship plan for their property, which makes them eligible for federal cost-sharing dollars to help carry out the plan. Most grants range from \$3,000 to \$5,000. Contact the DEM at 617-727-3180.
- **Urban Forest Planning and Education Grants.** Grants of up to \$10,000 are available to assist communities and non-profit groups in developing forestry programs that involve local residents and educators. Contact the DEM at 617-727-3180.
- **State Revolving Fund.** This fund supports water pollution abatement projects, and especially watershed management projects with substantial water quality and public health benefits. Typical projects include new wastewater treatment facilities as well as nonpoint source pollution abatement efforts. Contact the DEP at 617-292-5749.
- **Acquisition and Development Funds for Statewide Trails.** This program offers grants to acquire long-distance trail corridors as greenways linking public and nonprofit conservation land and to incorporate long-distance trails into local open space planning.
- **City and Town Commons Program.** This program provides grants to rehabilitate commons and squares in municipal centers.
- **Aquifer Land Acquisition Program.** This program provides grants to purchase lands in the primary area of contribution (Zone II) to public water supplies.
- **Massachusetts Highway Department's Bikeways Program.** Grants are available to develop bikeways and to provide bicycle parking facilities.
- **Clean Lakes Program.** This program aids municipalities in addressing problems of eutrophication of publicly owned lakes and ponds used for recreational purposes.

Other Resource Protection Tools

- **Conservation Restrictions.** A landowner may place restrictions on his or her deed, either temporarily or in perpetuity, to keep the land in an open, natural, or scenic condition. Local Conservation Districts provide technical and financial assistance to landowners seeking Conservation Restrictions. Contact the Plymouth Conservation District at 508-295-5495.
- **National and State Registers of Historic Places.** These programs may be used to protect historic buildings, districts, and sites. A local party often initiates the registration process. These programs are discussed further in the Cultural and Historical Resources section, above.

- **Local Historic Districts.** These districts vary in their level of protection, but commonly provide for a design review process to ensure aesthetic consistency within the district. This option is discussed further in the Cultural and Historical Resources section, above.

Community Preservation Act

Over the last several years, the Massachusetts State legislature has been debating legislation that would enable municipalities to establish a small excise tax on the transfer of land to be used for open space preservation or affordable housing. To date, this legislation has failed, although several towns have succeeded in enacting special legislation that allows them to proceed with such a program.

It is important to note that the legislation does not require municipalities to enact the deeds excise tax. In a recent draft of the bill, the maximum excise tax is 1%, and a community can exempt up to \$100,000 of every purchase from this tax. The legislation would mandate that at least 10% of the fund be used for each of three programs: open space, historic preservation, and affordable housing. The remaining 70% could be allocated in a manner that meets the community's goals and objectives. In Duxbury, such a revenue stream could be used to implement a number of townwide objectives, such as open space acquisition, historic preservation, and sewage disposal improvements.

This approach has worked in other communities, most notably Nantucket and Martha's Vineyard, which have used the funds predominantly for open space preservation, affordable housing, and maintaining community character. If this legislation becomes law, Duxbury should consider adopting a real estate transfer tax. It will enhance the implementation of the recommended land use scenario by providing additional financial resources for acquiring open space, thereby protecting community character and the Town's environment.

Section 4: HOUSING

Section 4: HOUSING

Introduction

This analysis of housing in Duxbury includes demographic trends affecting housing, existing conditions, current housing costs, housing needs, community goals for housing, and recommendations relating to the implementation of such goals.

The most recent data available was used wherever possible to describe the existing conditions. While some of these historical figures are not up to date, the purpose for including them is to provide a sense of how Duxbury has developed in the recent past, and to provide an indication of what conditions are today.

4.1 OVERVIEW OF EXISTING HOUSING CONDITIONS

Existing Housing

As of January, 1999, there were approximately 5,423 year round housing units in Duxbury, an increase of approximately 600 units since 1990. In addition there are about 314 seasonal residences in the town.

The age of the housing stock in Duxbury is shown in Table 4-1. Close to 65% of Duxbury's housing was constructed after 1959. The peak decade for home construction was the 1970s, while the pace of construction has declined through the 1980s and 1990s.

Table 4-1
Age of Housing Stock, Duxbury, MA

<u>Year Built</u>	<u>Total Units</u>	<u>Percent of Total</u>	<u>Cumulative Percent</u>
1939 or Earlier	1,264	22.0	
1940 to 1949	277	4.8	26.8
1950 to 1959	481	8.4	35.2
1960 to 1969	704	12.3	47.5
1970 to 1979	1,310	22.8	70.3
1980 to 1989	1,101	19.2	89.5
1990 to 1998	600	10.5	100.0
TOTAL	5,737 units	100.0%	

Source: U.S. Census, Town of Duxbury Building Permit data

The type of housing structures in Duxbury in 1998 is displayed in Table 4-2. Close to 89% of the housing in Duxbury is single-family, while buildings with two or more units comprised approximately 10 percent of housing in 1998.

Table 4-2
Units By Type of Housing Structure, 1990 and 1999

<u>Units in Structure</u>	<u>April, 1990</u>	<u>Percent</u>	<u>1998</u>	<u>Percent</u>
Single-family	4,704	91.6%	5,079	88.5%
Two-family	26	0.5	↑	↑
3-4	51	1.0	590	10.3
5 or more	288	5.6	↓	↓
other	68	1.3	68	1.2
Total	5,137		5,737	

Source: U.S. Census, Town of Duxbury Building Permit Data (as of January 1, 1999)

⁽¹⁾ There may also be an unknown number of illegal in-law apartments.

About 80% of the occupied housing units in Duxbury in 1990 had three or four bedrooms. Approximately 8% percent had five or more bedrooms. The median number of rooms in all housing units in Duxbury in 1990 was 8.

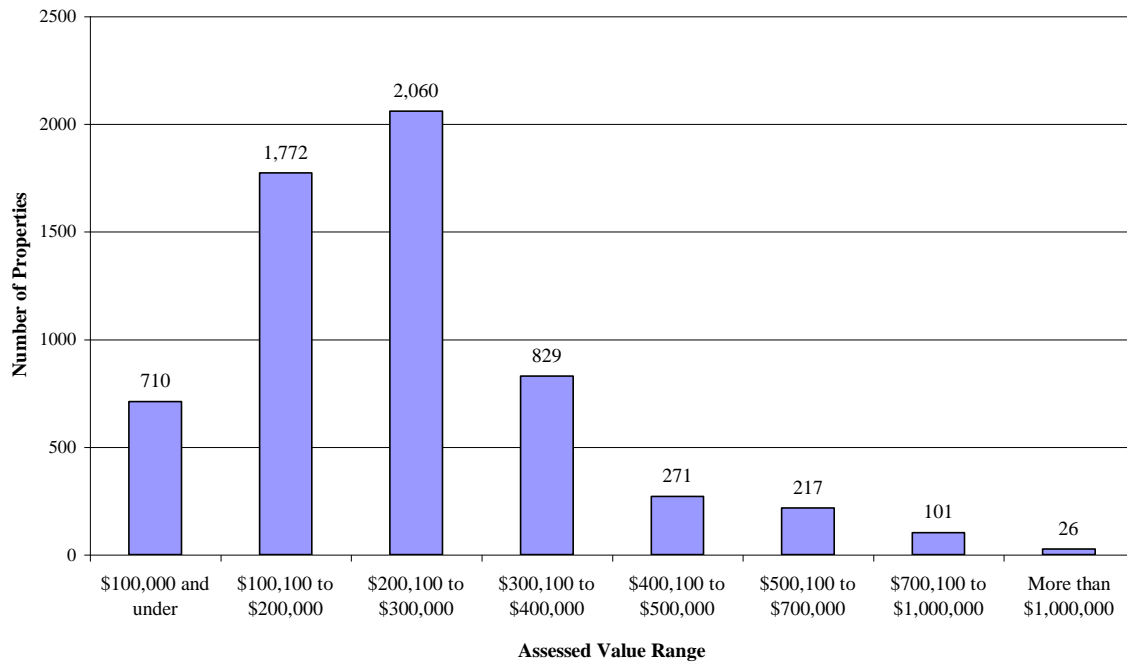
Existing zoning regulations require a minimum residential lot size of 40,000 square feet per dwelling unit in the Residential Compatibility District (or a similar density if cluster development), while lot sizes in the Planned Development Districts vary. The density allowed within the Planned Development Districts is summarized in the Land Use section. The size of dwelling units and certain architectural features of residential development within the Planned Development Districts are regulated to assure an appropriate diversity and quality of residential development.

The rate of occupancy by homeowners is higher in Duxbury than in the region as a whole. Approximately 87% of housing units in Duxbury in 1990 were owner-occupied. A total of 586 units were renter-occupied. This rate of home ownership is about the same in 1999. There are very few seasonal rental units.

Assessed Valuation

The majority of homes in Duxbury were valued at \$100,000 to \$300,000 by the Town Assessor in 1999. A considerable number of homes were assessed at higher values, with a few assessed at over \$1,000,000. Note that the assessed value may not reflect the sales price if these homes were placed on the market.

**Figure 4-1
Town of Duxbury
Residential Assessed Values for FY 1999**



Availability

Vacancy rates are an indicator of the availability of housing units. A vacancy rate of 5% is considered to be ideal because it allows occupants to move freely in the marketplace. A vacancy rate of under 5% indicates that there is demand for additional rental housing.

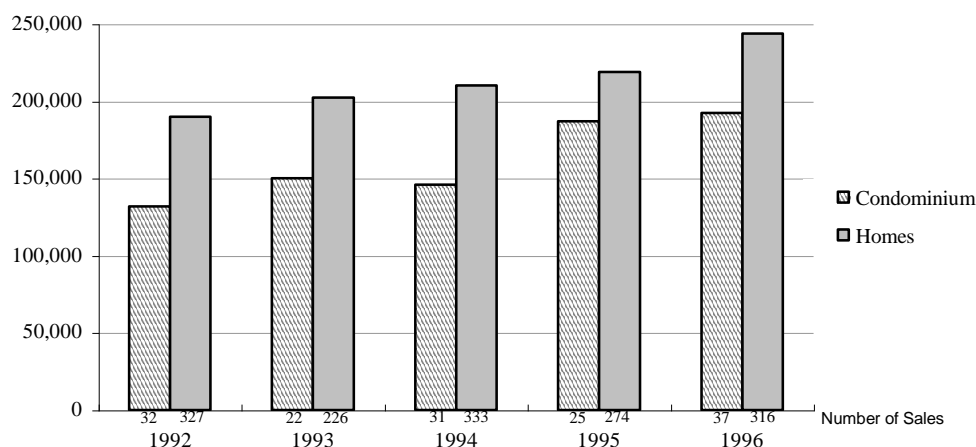
Vacancy rates for single and two-family homes have been consistently low in Duxbury. In 1990 the vacancy rate was 2.6% for all owner occupancy units. According to real estate professionals interviewed, there are generally 150 to 175 homes on the market at any given time. The average length of time on the market is 130 days.

There are very few, if any, rental units on the market presently. Turnover for rental units is quite low. Almost all units are rented directly by the owners, and turnover is generally in the late summer.

Housing Costs and Affordability

There were 353 residential units sold in 1996, of which 316 were single family homes. The median sales price for a single family home in 1996 was \$243,625, while the median sales price for a condominium was \$192,500. This represents an increase of 9.2% in the median sales price for all residential units from 1995 to 1996. In comparison, the median sales price for homes in Plymouth in 1996 was \$120,000, and for condominiums, \$97,500; while the median sales price for homes in Kingston was \$150,000, and \$82,000 for condominiums.

Figure 4-2
Median Residential Sales Prices, 1992-1996
Town of Duxbury



Source: Banker & Tradesman

Cost of Rental Housing

The cost of renter-occupied housing in Duxbury has also increased. Although the rate of the increase was somewhat less than that for owner-occupied homes between 1980 and 1990, current estimates show higher rates of rent increase since 1990. In 1990 median gross rent was \$678 per month, an increase of 167% over 1980. Current rental costs are estimated at \$1,500 to \$3,000 per month for a 3-4 bedroom house. Rents for apartments and condos are about the same as for small houses. Very few of the town's 590 apartments or condominiums are currently available for rent.

Affordability

Affordability of housing is measured not only in terms of the price of housing, but also in terms of the household living in it. A generally accepted standard used to define affordability of housing is that it should cost no more than 30% of household income. A guideline used by banks when evaluating home mortgage applications is that monthly payments do not exceed 30%-33% of household income.

Homeowners in 1990 (with mortgages) spent an average of 24% of their income on housing costs, while renters spent about 30% of their incomes on housing. Housing costs in the Boston area have continued to rise faster than incomes in the 1990's. The gap between housing costs and household income is steadily widening.

It should be noted that the term "affordable housing" is relative, since it depends on the income of the household. Affordable housing is not the same thing as subsidized housing for persons of low and/or moderate income, although subsidized housing is one type of affordable housing.

Low and Moderate Income Housing

There are a total of 199 publicly assisted housing units in Duxbury, including 172 units for elderly/disabled persons and 27 units for families. These provide housing for persons of low and moderate income. Low income is defined by the U.S. Department of Housing and Urban Development (HUD) as income that does not exceed 50% of the median family income for the region; moderate income is defined as income that does not exceed 80% of median family income.

The Duxbury Housing Authority manages two State-funded complexes. The Duxbury Housing Authority oversees 52 units of elderly/disabled housing under Chapter 667 at Duxborough Village at 59 Chestnut Street and 8 units of special needs housing for mentally retarded adults under Chapter 705 at 75 Merry Avenue. In addition the Housing Authority owns and maintains six scattered site units in the town under Chapter 689 which serves the needs of low income families.

Island Creek (near Exit 10 off Route 3) is an affordable housing complex that was developed with financing through the Massachusetts Housing Finance Agency (MHFA). Within this development are 58 units that are federally subsidized under Section 8, of which 48 are available for elderly and handicapped persons, while 10 are available for families with children. There are also 48 elderly/disabled units which are subsidized under Chapter 13A, an MHFA program which offers a mortgage subsidy to the owner of apartments that are rented for fixed amounts below the market rate.

Income limits vary depending upon the federal or state program which subsidizes housing.

Table 4-3
1996 Income Limits for Federal and State-Aided Programs

Family Members	Total Gross Family Income (Boston PMSA) ⁽¹⁾			
	Federal Low Income	Federal Very Low Income	State (Except MRVP ⁽²⁾)	State MRVP ⁽²⁾
1	\$30,450	\$20,850	\$29,100	\$15,780
2	\$34,800	\$23,850	\$33,300	\$21,220
3	\$39,150	\$26,800	\$37,450	\$26,660
4	\$43,500	\$29,800	\$41,600	\$32,100
5	\$47,000	\$32,200	\$44,950	\$37,540
6	\$50,450	\$34,550	\$48,250	\$42,980
7	\$53,950	\$36,950	\$51,600	\$48,420
8	\$57,400	\$39,350	\$54,900	\$53,860

Source: Duxbury Housing Authority

⁽¹⁾ Primary Metropolitan Statistical Area

⁽²⁾ Massachusetts Rental Voucher Program

The State Rental Voucher Program and Federal Section 8 program provide subsidy vouchers for low and moderate income families to seek housing in the private market. As of December, 1997 the Duxbury Housing Authority administers nine vouchers under the Massachusetts Rental

Voucher Program. This program has not been funded to continue, and as families leave the program, vouchers cannot be reissued to new families. The number of rental vouchers offered through this program has declined from 35 in 1992. In addition there are 13 Federal Section 8 housing certificates administered by the Duxbury Housing Authority and five Section 8 certificates administered by the South Shore Housing Corporation. Funding for the federal Section 8 housing program has remained steady up to this time.

4.2 DEMOGRAPHIC TRENDS AFFECTING HOUSING

There are several demographic trends that affect the quantity of demand for different types of housing.

A review of the age structure of Duxbury residents indicates a relatively modest increase in the number of residents in the 30 to 44 year old age range between 1980 and 1990, but a decline expected in the coming decades. This is the age at which many people are married and are starting families, or are living in independent households. Although there was an increase in overall population, the younger age cohorts have declined in recent years, both in share of population and in absolute number of persons.

In contrast, there has been a significant growth in the older age groups. The number of persons 65 and over increased by about 41% from 1980 to 1990, while the 45 to 64 year old age group that is approaching retirement increased by over 57%. Population forecasts show that the only population growth in coming decades will be in these age cohorts, which will total nearly 48% of the population by the year 2010.

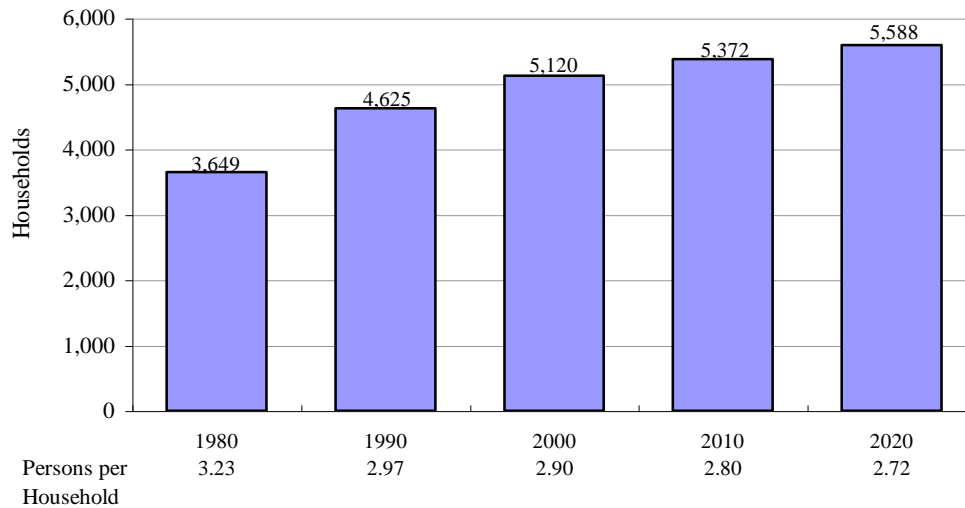
Table 4-4
Age Distribution 1980 - 2010

	<u>1980</u>		<u>1990</u>		<u>2000</u>		<u>2010</u>		Percent Change (<u>1990 – 2010</u>)
	<u>Person</u>		<u>Person</u>		<u>Person</u>		<u>Person</u>		
	<u>\$</u>		<u>\$</u>		<u>\$</u>		<u>\$</u>		
0-14	3,230	27.4%	3,240	22.3%	3,273	22.0	2,906	19.3%	-10.3%
15-19	1,192	10.1	1,047	7.5	1,010	6.8	976	6.5	-6.8
20-29	1,176	10.0	1,320	9.5	1,024	6.9	1,033	6.8	-21.7
30-44	3,133	26.5	3,616	26.0	3,024	20.4	2,978	19.8	-17.6
45-64	2,057	17.4	3,234	23.3	4,747	31.9	4,381	29.1	35.5
65 & over	<u>1,019</u>	8.6	<u>1,438</u>	10.3	<u>1,784</u>	12.0	<u>2,785</u>	18.5	<u>93.7</u>
Total	12,622		13,895		14,880		15,059		8.4%

Source: U.S. Census, MAPC

The number of households in Duxbury increased from 3,649 in 1980 to 4,625 in 1990, an increase of 26.7% in this period, compared to an overall population growth of only 17.7%. This disparity is related to the decline in the number of persons per household in Duxbury from 3.23 persons in 1980 to 2.97 persons in 1990. This decline reflects a regional, indeed national trend, to smaller household size.

Figure 4-3
Household Forecast for Duxbury



Source: Metropolitan Area Planning Council

There has been a slight decrease in the number of family households that are headed by females. In 1980 8.7% of the households in Duxbury were headed by females; by 1990 this figure had decreased to 8.3%. This counters the state-wide and national trend, in which a rise in the number of female-headed households reflects an increase in separate households. The trend in Duxbury may reflect a decline in the number of families with older children, as suggested by the changing age structure. An increase in non-family households also reflects a change in the structure of household types⁽¹⁾. The proportion of households in Duxbury that were not families rose from 15.1% in 1980 to 18.1% in 1990.

To conclude, trends indicate that the rate of new households in Duxbury is increasing faster than the population as a whole. Households also tend to be slightly smaller than in previous years, and less likely to be composed of families. Duxbury's demographics indicate a need for additional housing units for emerging new families, separate households, and for the elderly.

4.3 HOUSING NEEDS ASSESSMENT

As the preceding discussion has shown, housing, a basic necessity of life, has become increasingly expensive. As housing prices have risen throughout Massachusetts in recent years, more and more residents are being priced out of the housing market. Families and individuals

⁽¹⁾ A family household is defined by the U.S. Census as persons living together who are related by birth, marriage, or adoption. Step families and families living with unrelated foster children are also counted as families. Non-families include single individuals, unmarried partners, roommates, and other group living situations.

are forced to spend an increasing share of their incomes on shelter, meaning they have less money to spend on other things. For some very low income people this may mean that they do not have enough to spend on other necessities such as food, clothing, or medical care. Duxbury residents are not immune to this trend.

Several groups have been more greatly affected by increasing housing costs than the population as a whole. These include young adults, the elderly, single heads of households, would-be first time homebuyers, and persons with low or moderate income. Not all of these people are eligible for, or desire, subsidized housing. They are households that have been priced out of the housing market by rapidly rising costs.

First-Time Homebuyers

According to the National Association of Realtors the rate of homeownership among young adults has declined since 1980. This can be attributed to both the increase in purchase prices for homes, and also to the increase in rents which makes it difficult to save the money necessary for a down payment.

While incomes in Duxbury may be higher than the national average, housing costs are also substantially higher. Therefore it may be assumed that would-be first-time homebuyers in Duxbury are experiencing the same or greater difficulty.

Elderly

Since the elderly are usually retired and living on pensions that often do not keep pace with rapidly rising costs, they are likely to be affected by increasing housing costs. Some elderly individuals and couples may be living in a large house they no longer need or want, but cannot move because there is no suitable, affordable, housing available. These people may be "house poor"; their only major asset is their house, but they may not be able to adequately maintain it, or be able to afford replacement housing if they sell it.

Young Adults

Young adults, including singles and young families, frequently need to rent housing until they become more established and can save enough for a down payment on a home. Some young adults may value the mobility that living in a rental unit offers, but want to stay in their hometown. Many of Duxbury's young adults cannot afford rents charged in private apartments or homes or the down payment and carrying costs of a single family home. Frequently these first time homebuyers turn to the condominium market when they are ready to purchase.

Low and Moderate Income Housing

One indication of the need for housing for individuals and families with low and moderate income is the length of the waiting list for available units. As of December, 1997, there were 65 elderly/disabled persons waiting for units at the Duxborough Village complex, while waiting lists for subsidized family units and rental vouchers under all programs were closed. Preference is given to elderly persons over disabled persons and Duxbury residents over non-residents. The wait for elderly/disabled persons who are Duxbury residents for units at Duxborough Village is up to one year, while non-residents wait 3-5 years. The waiting time for families is at least four years.

State Standards. Another way of assessing demand for subsidized units is through the standards set by the state. Section 20 of Chapter 40B of state law (often referred to as Chapter 774) sets a standard that 10% of the housing units in a community be available for people with low and moderate incomes. Currently only about 3.6% of Duxbury's housing units are available to persons of low and moderate income. This percent is similar to other suburban communities. Under the 10% standard, Duxbury should have a total of approximately 564 units, a shortfall of approximately 365 units. The State guidelines are based on the 1990 U.S. Census count of year-round housing units.

In order to enforce Chapter 774, the State has issued Executive Order 215, which provides that discretionary state funding can be withheld from any community that does not meet the 10% standard. In practice, the State will not impose Executive Order 215 if it deems the community is making a good faith effort to meet its obligations. In view of the current shortage of state and federally assisted units for low and moderate income persons, it is very difficult for a community to comply.

Another aspect of Chapter 774 allows the State to override local zoning, via the comprehensive permit procedure, for communities that do not meet the 10% standard. When a comprehensive permit is issued, housing may be constructed in areas that the community may feel are not well suited to this type of development.

Chapter 774 was recently revised to provide for a Local Initiative Program (LIP) which encourages local governments to work in partnership with project sponsors. In this manner, a portion of units provided (approximately 25%) are reserved for low and moderate income persons and the community has the opportunity for input into the design and development of the project, while avoiding lengthy litigation.

Housing subsidy needs may be impacted by the Immigration and Welfare Reform Act enacted in August, 1996. This landmark legislation significantly changes the type, tenure and amount of welfare assistance to the poor. Although Massachusetts has had welfare reform measures in place prior to 1996, they did not go into full effect until the passage of the Federal legislation. The combination of welfare changes and reduced funding for housing at both the state and federal level are expected to challenge the capacity of local housing authorities and local communities. Some Housing Authorities are converting public housing units to ownership units for low and moderate income people. Some communities are creating housing partnership with State assistance to find new ways to finance low and moderate income housing, frequently including the participation of local government and the private sector.

Senior Housing

As indicated above, eligible applicants for subsidized elderly housing in Duxbury wait approximately one year for placement. Rent for such units is approximately 30% of gross income.

Low/moderate income housing units for elderly persons are offered at Island Creek Village (106 units) and Duxborough Village (52 units). Market rate housing for elderly persons is offered at Villages at Duxbury. This complex includes 168 limited care to full care units.

Condominiums for purchase are frequently priced at less than a senior couple or individual can obtain if selling an existing older home. In addition, many units are not suitably designed for senior needs.

There is also a need for more senior housing, in all income categories, which includes assistance in home care, meals, and medical care. This type of housing will reduce or delay the number of seniors going into nursing homes.

Handicapped

The term "handicapped" includes people with a wide range of disabilities which include physical, mental, and emotional disabilities. Each of these groups have different, but special, housing needs. Persons with mental or emotional disabilities may need a living situation that includes care. Physically challenged individuals often require special construction that includes extra-wide doors, lower counters and special bathroom facilities. These special types of housing are frequently ignored by the private sector. There are eight units of subsidized special needs housing at Merry Avenue maintained through the Duxbury Housing Authority, while subsidized units for disabled persons are also available in the Duxborough Village complex. Subsidized units for disabled persons are also offered at Creek Village; however, preference is given to elderly persons over disabled persons in assigning these units.

Market-Rate Housing

The largest share of housing in Duxbury is for middle and upper income families and individuals. The Comprehensive Plan must also address steps needed to protect the integrity of Duxbury's neighborhoods and to determine the appropriate mix of single family and other forms of housing.

4.4 HOUSING GOALS AND POLICIES

As a non-urban settlement, Duxbury does not feel the pressures for diversified housing that more urban communities experience. Such communities have large employment concentrations within their borders or are commuting suburbs near such centers. Duxbury has relatively little economic activity (other than that serving local needs), but may increasingly become a commuting suburb (especially as regional transportation facilities are expanded).

A plan should be developed that examines the ability of certain areas of the community to provide adequately for senior, moderate income, and lower income housing opportunities, as appropriate, specifying the number of units needed and the financial means to provide for those units.

Duxbury is largely a community of single-family homes, with a limited amount of other housing types. Goals related to this type of housing include the following.

1. Preserve and strengthen the appearance of the town's neighborhoods and protect them from adverse influences.
2. Integrate new or expanded housing into existing districts and neighborhoods so that it is not physically or environmentally disruptive to the existing style and scale.
3. Regulate the replacement of older smaller homes by larger new homes ("teardowns").

As discussed in the inventory section, there are segments of the existing and future population that may require housing other than upper income single-family homes. Goals related to these housing needs include the following.

4. Encourage independent living for elders, handicapped and others with special needs.
5. Diversify housing options consistent with community character.
6. Determine the level of assisted housing that is appropriate for the town and find means of accomplishing the stated goals.

As shown in the analysis above, Duxbury is facing increasing market pressures for residential development. Demographic changes, as well as regional market trends impact the demand for housing. The South Shore subregion of MAPC is expected to grow faster than the region as a whole in terms of population. According to MAPC projections, the population of Duxbury is expected to grow by about 9% between 1990 and 2020, while the number of households is expected to grow by about 21%, or about 1,000 households. Experience since 1990 indicates that these projections may be on the low side. The higher rate of household formation reflects a general trend toward smaller household size. Another demographic trend that Duxbury is experiencing is a change in the age structure. The younger age cohorts (under age 45) are declining in absolute numbers, while by 2020 the number of retired persons (age 65 and over) is expected to increase by about 110% over the present senior population.

4.5 HOUSING RECOMMENDATIONS

Primary Recommendations

1. Develop proactive policies to address diverse housing needs within the Community.
2. Review the in-law apartment provisions of the Zoning Bylaw to ensure consistency with Plan Goals.
3. Improve data collection to determine special housing needs in the Community
4. Seek to control “teardowns” by increased dimensional controls including possible new floor area ratio (FAR) regulations and lot coverage, height and yard requirements.
5. Preserve the aesthetics and character of existing neighborhoods.

Secondary Recommendations

None.

Section 5: PUBLIC FACILITIES AND SERVICES

Section 5: PUBLIC FACILITIES AND SERVICES

Introduction

The purpose of this Public Facilities and Services chapter is to: 1) prepare an inventory and analysis of Duxbury's primary municipal buildings, public schools, and town-owned recreational playfields to establish a base line of information upon which the Town can then assess its future public facilities needs, 2) report on these facilities' current usage, condition, and status, 3) document the Town's goals for maintaining and expanding those services if necessary, 4) assess future need, and 5) make recommendations for future facilities and services based upon the Town's goals and assessed needs.

Over the past several years, Duxbury has engaged in an ambitious program to upgrade, reorganize, and renovate many of its municipal properties. For example, a new Water Treatment Plant is now completed and operating. The new Duxbury Free Library was recently completed at the former Upper Alden School. The School system was reorganized in 1997 with various grades relocated from one school to another to best take advantage of available space and align facility needs with educational policies. Additional accessible meeting rooms have been provided for public meetings and hearings throughout the town, including a new large meeting room at the new Duxbury Free Library and a new large meeting room in renovated basement space at the Town Office Building. Plans exist to expand and reopen the Ashdod Fire Station in 1999; and, the Council on Aging has undertaken a Feasibility Study to find a new permanent home for the Senior Center and COA offices. Because of these ambitious programs, much has already recently been accomplished to accommodate future facilities and service needs that will serve Duxbury well for the next decade or more.

Other municipal facilities needs and deficiencies still need to be addressed, however, and new opportunities may now present themselves at municipal properties that are either substantially underutilized or which have recently become available. For example, can a portion of the Mayflower Cemetery be transferred to the Council on Aging to eventually provide a new Senior Center? Does Town Hall need additional office space? Options for addressing questions such as these, and others, are addressed in this section. The location of public facilities is shown on Figure 5-1.

5.1 INVENTORY OF MUNICIPAL FACILITIES

Municipal Buildings

Town Office Building

878 Tremont Street

Jurisdiction: Selectmen

Construction Date: 1967

Description. The Town Office Building is approximately 17,306 square feet in size. It consists of two floors and a full basement and it houses the majority of town administrative and finance offices as well as land use, engineering and clerk's office. The building is steel framed with concrete slab floors and it is clad in aluminum siding. The building is in good condition.

The first floor of the Town Office Building provides offices for the Town Clerk, Assessors/Tax Collector, Treasurer, Public Works, Water Department, Veterans Agent, and Receptionist. The second floor hosts the Selectmen's Office, Accountant, Board of Appeals, Planning Board, Board of Health, and Building Inspector. The basement has been recently renovated to provide a new public meeting and hearing room.

The Town Office Building, although in very good condition, is not large enough to accommodate all town departments and employees that may want to be located here. Offices for the Water Department, Board of Health, and Planning Department, for instance, are crowded and in need of additional office space, plan layout space, and small conference areas.

Accessibility Compliance. The Town Office Building contains most of the basic elements to meet state and federal accessibility/ADA requirements. For example, the building has an accessible entrance from the exterior, the building has an elevator, and restrooms on the first floor have been modified for accessibility. Many detailed accessibility requirements are not met, however.

Issues. Should more Town departments be relocated to or consolidated at the Town Offices to improve internal coordination and communications between departments? If so, where would they be accommodated? One possible solution is to convert the Old Town Hall next door into an office and conference room annex of the Town Office Building (possibly even connecting the two buildings with a pedestrian bridge) once the Senior Center and Council on Aging can be relocated to a new home. Another issue that needs to be clarified is whether the Records Storage Vault is fully compliant with current State regulations which specify fire rating requirements and temperature/humidity controls within the Vault.

Old Town Hall (Temporary Senior Center)

862 Tremont Street

Jurisdiction: Selectmen; Occupied by Council on Aging

Construction Date: 1870

Description. The Old Town Hall is approximately 2,857 square feet in size and hosts a single main floor area and a small mechanical mezzanine. The building, which is immediately adjacent to the Town Office Building, is wood framed and clad with wood siding and is almost identical in shape and appearance to the Town Office Building next door. The building is now used temporarily by the Council on Aging (COA) as its headquarters after it was required to vacate the Senior Center in the basement of the Lower Alden School, which it had shared with the Recreation Department, to accommodate a growing school population.

COA also operates many programs for seniors from this facility, including Meals on Wheels, congregate lunch meals, the Senior Bus, lending library, classes and health clinics, Bridge Club, bingo, dances, parties, and informational programs such as the Senior Health Information for Elders (SHINE) program.

According to the Director of the Senior Center, the building is not large enough to accommodate all these various programs. The COA estimates that it needs 16,000 to 20,000 square feet of space on two acres of land to accommodate its various programs and possibly incorporate 2,000 square feet of space for the Thrift Shop which employs senior volunteers and which has recently bounced from home to home. Therefore, the COA is now sponsoring a Senior Center Feasibility Study to find a new permanent home for the Senior Center. The study is now underway.

Several town-owned candidate properties will be examined in this Feasibility Study. At present, the leading candidate is an unused portion of the Mayflower Cemetery Property. (The old Duxbury Free Library had been briefly considered as a candidate site earlier. However, according to the COA, the old Library is too small, ADA compliance would be very costly to undertake, there is no parking available at the old Library, and the busy surrounding traffic patterns may endanger the safety of arriving seniors. Therefore this site was rejected.) Other candidate sites may include town-owned property near Millbrook Motors, town-owned lots on Lincoln Street, or a combination of State and town sites near the State Highway maintenance site.

Accessibility Compliance. The Old Town Hall now meets some of the basic conditions for accessibility. For example, the sidewalk has been sloped up to the main entrance to create an accessible entrance. On the other hand, the toilet rooms are not fully compliant with accessibility standards although there have been substantial modifications to them to make them essentially accessible.

Issues. The Town would like to use the building as additional town offices, meeting space for large meetings and public hearings. This will require the relocation of the Council on Aging, and its programs, to another location. (See discussion above.)

Old Duxbury Free Library (former library)

147 St. George Street

Jurisdiction: Selectmen

Construction Date: 1909

Description. The Free Library is a building approximately 14,302 square feet in size that was originally given to the town by the Wright family. It consists of the original 1909 building and a later modern addition at the rear. The building had served as the Town's Library since 1909, but a new replacement Library opened in November of 1997. Presently the building is partially in use, including the Magic Dragon Children's Pre-School Center.

The building had hosted library administrative offices, circulation desk, reading room, the adult library, children's library, and the Helen Bumpus Gallery. The building is restricted, by deed, to include a reading room. If it is used for other purposes, according to this restriction, its ownership reverts to the Wright family who originally donated the property. In 1998, the Town decided to reuse the former library for School Department and other educational uses for a one year trial basis.

The old Library is a one story (but multi-level) building with a full basement. The building is a combination steel and concrete building with a newer addition to the original structure. The building has deteriorating fenestration, and rusting structural support members.

Accessibility Compliance. The building is in poor conformance with accessibility requirements, compounded by the multi-level nature of the facility. The exterior main entrance is accessible by ramp but its design is not fully compliant. The ramp to the Children's Library on the lower level is code compliant. The various levels of the building make many areas of the building inaccessible to the public - including office areas, meeting areas and open areas. The existing restrooms are non-compliant with accessibility codes and standards.

New Duxbury Free Library (former Upper Alden School)

Alden Street

Jurisdiction: Selectmen, Library Trustees

Construction Date: 1926, converted and renovated in 1997

Description. The new Duxbury Free Library opened in November of 1997 in the converted and newly renovated facility of the old Upper Alden School or High School. The new Library, funded in part by a federal grant, state grant and private donations, is a state-of-the-art two story building with basement. There is ample room for expansion of library services and collections in the future.

The main floor consists of the circulation desk, reading rooms, stack areas, periodicals, video rentals, the Helen Bumpus Gallery, and the Children's Library. The upper level hosts the Reference Desk, administrative offices, the Lanman Trustees/conference room (which may be reserved for meetings), reading rooms stack areas, and the Kispert Homework/Center where computers are available for Internet access and word processing. The basement includes storage, restrooms, and two meeting rooms. The Setter Room is suitable for small groups. The Merry Meeting Room is a large 90 person-capacity meeting room, accessible by its own exterior entrance, to accommodate public meetings and hearings sponsored by other Town Departments as well as Library Board meetings and other educational and community programs. The meeting

room in the basement can be secured at night from the rest of the Library and used for meetings that extend beyond evening Library operating hours.

Accessibility Compliance. The new Library and its parking lot is fully compliant with accessibility standards.

Police Station

443 West Street

Jurisdiction: Police Department

Construction Date: 1963

Description. The Police Station is approximately 8,465 square feet in size. It is a two story, three level building with a full basement. The building is a shingled wood frame structure with a pitched roof. Although it appears to be in good condition when seen from the outside, it is only in fair to poor condition on the interior. The building accommodates Duxbury's Police Department and contains offices, a multi-purpose meeting/training/lounge/kitchen area, the dispatch and communications center (including Enhanced 911 system) for both the Police and Fire Departments, a three-cell lock up, and a 3-bay garage where vehicle maintenance is performed. The basement houses a staff exercise room, sauna, locker room, and mechanical rooms.

The Station is judged deficient by the Police Chief to optimally support modern police operations. When the Station was first constructed, there were approximately 12 employees. Today there are over 50 personnel. This growth in personnel has resulted in obvious and severe space shortages and deficiencies. Additionally, many rooms are in poor or run-down condition, there is water leakage into the building, the basement is poorly lighted, and the internal space layout is not optimally configured to support efficient operations.

Specifically, some of the space deficiencies include: inadequate evidence and stolen property storage space, cramped and poorly configured office spaces, cell lock-ups not in compliance with State Code requirements (which can place the Town in jeopardy of law suits), cramped facilities for the dispatch/communications center, no shower facilities for female officers, poor locker room facilities for male officers, and an inadequate multi-purpose meeting room that must accommodate multiple functions such as meetings, lounge space, and kitchen use. Additionally, on the exterior of the site, there are inadequate parking spaces, particularly during shift changes, and the perimeter security lighting is poor.

As a result of these many deficiencies and space shortages, there has been discussion of constructing an entirely new facility for Police Headquarters. At times, it has been suggested that a new combined Police/Fire Public Safety Headquarters Building be built.

Accessibility. The Station's entry is accessible by exterior ramp, its lobby is accessible to the public, and a unisex restroom near the front entrance has been modified for accessibility. Its office areas, however - particularly on the second floor - are not accessible since there is no elevator, and therefore do not readily allow for disabled administrative employees or visitors. The second floor need not necessarily be made accessible if all public access, meetings, and disabled personnel can be accommodated in spaces on the first floor.

Fire Department Facilities

At present, the Fire Department operates all of its fire apparatuses from the Central Headquarters Station on Tremont Street. The former Ashdod Fire Station on Franklin Street at Route 14 has been leased to a private paramedic/ambulance service. In 1998 the Town approved reopening and expanding the Ashdod Fire Substation as a fully staffed facility. When the Ashdod facility is completed, these two stations, in combination, are expected to provide adequate emergency coverage to almost all parts of town. (At present, 57% of the town's population is within a four minute response time zone - which is considered desirable. When Ashdod reopens, it is anticipated that 95% of Duxbury's population within this four minute response zone.) Only one part of town - Duxbury Beach - remains remote and difficult to serve. However, this neighborhood is well covered under a mutual aid agreement with neighboring towns.

Central Fire Station Headquarters

Tremont Street at Heritage Lane

Jurisdiction: Fire Department

Construction Date: 1967; renovated 1988

Description. The Central Fire Station is approximately 9,116 square feet in size and serves as Fire Department headquarters as well as the primary fire station. It consists of a main floor, a small upper floor, and a small basement. The main floor contains a three-bay drive-through apparatus room. The building is a wood and concrete block structure. In general, the station is in fair to good condition, although there are interior water damage problems and deteriorated windows. The building is well located to provide adequate emergency response times to most parts of the town, particularly the more densely populated portions of town east of Route 3. The Central Fire Station Headquarters site is also the location of the town fueling pump which serves all town vehicles. New tanks and a vapor recovery system that meets EPA compliance standards were added during the past year.

The main floor north wing is a staff only area that includes a bunk room area, a day room and restrooms. In the basement level below this area is a day room, gym, and kitchen. The south wing contains Fire Department administrative offices. The conference/meeting room in the building is often used for meetings and classroom training sessions. Since it was renovated and made fully accessible for individuals with disabilities, this meeting room has also been used widely by the public for town committee meetings and community group meetings.

According to the Fire Chief, there is a need to renovate the personnel wing of the station to provide private bunkrooms instead of a dormitory, and to increase much needed storage space.

Accessibility Compliance. The main entrance and first floor public areas of the building are generally accessible, although there are no accessible restrooms and there are many minor upgrades necessary to bring the building into full compliance with accessibility standards.

Antique Apparatus Garage

Rear, Central Fire Station

Jurisdiction: Fire Department

Construction Date: 1985

Description. This one-story 850 square foot wood frame building at the rear of the Central Fire Station is a garage used to store antique fire apparatus. The 2-bay garage, constructed by funds raised by firefighters, is in good condition.

Accessibility Compliance. Since the building does not accommodate public access, accessibility standards are not applicable to this facility.

Ashdod Fire Station

Franklin Street at Route 14

Jurisdiction: Fire Department

Construction Date: 1971 (the Ashdod Fire Station is in the midst of renovations as of 10/15/1999)

Description. The Ashdod Fire Station is 2,742 square feet in size. The building is a two-story wood frame structure clad with wood shingles. It has a main floor of 1,616 square feet, an upper level of 480 square feet and a basement approximately 646 square feet in size. The ground floor includes a 2-bay apparatus room plus offices. In general, the facility is physically in satisfactory condition.

The Station is now leased to a private ambulance/paramedic service. In 1998, the Town approved the reopening of Ashdod as a staffed fire substation after a second story addition and a new 3-bay apparatus room is built. When reopened as a fire substation, Ashdod will continue to include leased space for the ambulance/paramedic service. The existing 2-bay apparatus room will be demolished to allow for this expansion. The new second floor addition will include four bunkrooms - two for firefighters and two for the paramedic personnel.

Accessibility Compliance. Now used as a private business service, the building does not have public access. Therefore, accessibility requirements are not currently applicable to this facility according to the Survey and Inspection Report. However, once the building is restored to use as a fire substation, its publicly accessible parts on the first floor will be brought into compliance with accessibility standards. Such public uses may include, in the future, space for plan review and permit applications.

DPW Compound

The DPW Compound consists of several buildings, including a new DPW Garage, the old DPW Garage, a sand shed, two small salt sheds, and a sign shop. The compound houses DPW and Highway Department trucks, vehicles and equipment. According to the Director of Public Works, these facilities adequately serve the facilities needs of the these departments.

Accessibility Compliance. According to the Survey and Building Inspection Report, accessibility requirements are not applicable to the following facilities in the jurisdiction of the DPW and the Water Department.

New DPW Garage

DPW Compound, 884 Tremont Street
Construction Date: 1995

Description. With access from Tremont Street, the Garage is located behind the Town Office Building. The new DPW Garage is 1,900 square feet in size. It has concrete foundation, floor slab and lower walls with corrugated siding and roof. The multi-bay garage is only two years old and is in good condition. The building shelters DPW vehicles.

Old Highway Department Garage

DPW Compound, 884 Tremont Street
Construction Date: 1959

Description. The one-story old Highway Department Garage is 7,651 square feet in size and accommodates an office area and a number of Highway Department vehicles. The walls are concrete block and steel frame with ribbed metal siding. The building is in fair to satisfactory condition.

Sand & Salt Sheds

DPW Compound, 884 Tremont Street
Construction Date: 1986

Description. The sand shed is 720 square feet in size and is used to store salt and sand for use in the winter to protect roads. The shed is a single-story wood-framed building with plywood and batten siding and metal roof. It is in satisfactory condition. Adjoining are two timber-constructed lean-tos used as salt sheds.

Sign Shop

DPW Compound, 884 Tremont Street

Description. The sign shop is a small one story wood framed enclosed shed where road and street signs are made.

Waste Transfer Station Building # 1

Mayflower Street

Jurisdiction: DPW

Construction Date: 1977

Description. The Transfer Station is a single-level facility used to transfer local waste and refuse to waste sites out of town. The building is a large open steel framed structure with corrugated metal siding, and is in generally satisfactory condition, although the interior is damaged. A new compactor was constructed in 1997.

Waste Transfer Station - Recycling Shed

Mayflower Street

Jurisdiction: DPW

Description. This building consists of a shed for separated recycled items such papers, plastics and glass bottles.

Sewerage Treatment Plant

Lovers Lane, Rear of High School

Jurisdiction: DPW (formerly School Department)

Construction Date: 1973

Description. The Sewerage Treatment Plant, until recently run by the School Department, is 3,600 square feet in size. It is used to treat sewerage from a number of municipal facilities along St. George Street and Alden Street, including the High School, Middle School, former Library, new Library, Percy Walker Pool, and Alden Elementary School. It has a capacity of 300,000 gallons a day. According to the Director of the DPW it will have to be rebuilt in five years because of obsolete technology. The Director estimates that its reconstruction cost will be in the \$300,000 to \$400,000 range. The Plant is a wood framed structure that encloses the sewerage equipment. The building is in satisfactory condition.

Maintenance/Testing Facility. This building is used for lab testing and includes supporting functions such as restrooms. It is 720 square feet in size. It is a one story concrete block and wood framed building with a shingled roof and shingle siding. The building is in need of upgrading.

New Water Treatment Plant

Evergreen Street

Jurisdiction: DPW/Water Department

Construction Date: 1998

Description. A new Water Treatment Plant has recently been constructed. The new plant allows the two Evergreen wells to be used for water supply to the Town. It is now expected that 1,100 gallons per minute of treated water will be available.

Water Department Vehicle Garage

1312 Tremont Street

Jurisdiction: Water Department

Construction Date: 1925

Description. The garage, 2,288 square feet in size, is a two story garage and maintenance facility. The main level contains a 1,288 square foot repair bay and maintenance shop. The 500 square foot mezzanine is used for office space and storage. The structure is load bearing masonry with steel roof trusses and miscellaneous wood framing. The building is functional, but requires complete upgrades for power, lighting and plumbing. The boiler needs replacement.

Cemeteries

The Town owns four cemeteries: Mayflower, Dingley, Ashdod, and Myles Standish. All are inactive except Mayflower Town Cemetery.

Mayflower Town Cemetery

774 Tremont Street

Jurisdiction: DPW

Description. The Mayflower Cemetery is the largest of the Town's cemeteries. This cemetery also houses the main administrative offices for the Town's cemetery operations as well as cemetery maintenance operations and the Crematory.

Cemetery Office & Garage

Mayflower Town Cemetery, R 774 Tremont

Construction Date: 1929

Description. The cemetery office, 2,590 square feet in size, is a one story wood frame structure with a partial basement and semi-detached 2-bay maintenance garage. The cemetery office is used by the public when visiting the cemetery. The building is in fair condition although its plumbing, heating and electrical systems are old and in poor condition.

Accessibility Compliance. The main office is used by the public and must be brought into compliance with state codes and federal ADA standards. The primary areas which need to be brought into compliance include the building entrance, the office area and the restrooms.

Crematory Building

Mayflower Town Cemetery, R 774 Tremont

Construction Date: 1980

Description. The Crematory Building, 1,732 square feet in size, is a one story wood frame building with concrete slab on grade. The building is clad with wood shingles. The building houses four gas-fired crematory furnaces and office space. The building is in generally good condition, although the electrical system needs to be upgraded. In 1997, close to 2,300 cremations were held compared to 84 interments. Cremations continue to increase while the number of burials decline.

Accessibility Compliance. According to the Survey and Building Inspection Report, accessibility requirements are not applicable to this facility.

Dingley Cemetery

West Street

Jurisdiction: DPW

Description. The Dingley Cemetery, one-half acre in size, has no capacity for additional burials. Accessibility improvements are required.

Ashdod Cemetery

Keene Street

Jurisdiction: DPW

Description. The Ashdod Cemetery is approximately one acre in size. No capacity for additional burials is available. The Cemetery is adjoined by a wooden chapel that is not owned by the Town.

Myles Standish Cemetery

Chestnut Street

Jurisdiction: DPW

Description. The Myles Standish Cemetery, two acres in size, is an historical site. No capacity for additional burials is available.

Other Properties

Dog Pound

R 884 Tremont Street, behind DPW Complex

Jurisdiction: Dog Officer, Police Department

Construction Date: 1989

Description. The Dog Pound, 224 square feet in size, is a single story concrete block building with a small office, four cage compartments, and attached dog runs. The building is in satisfactory condition.

Accessibility Requirements. Since the building is visited by the public, it must comply with state codes and federal ADA accessibility requirements. At present, the building is not compliant. Accessible parking must be provided, the entry door and threshold must be brought into compliance; and other miscellaneous improvements are required.

Girl Scout House - Recreation Department

20 Washington Street, Halls Corner

Jurisdiction: Selectmen (used by Recreation Dept.)

Construction Date: 1910

Description. The Girl Scout House, 2,467 square feet in size, is used as a Meeting Room in the front of the building and as the administrative office headquarters of the Recreation Department at the rear of the building. The one-story wood frame building includes a 1,857 square foot main floor and a 610 square foot basement. It is clad in both wood clapboards and aluminum siding.

The building is in fair condition, but improvements are needed for the electrical system, and the exterior and interior finishes need upgrading as well as repairs to the foundation coating. Additionally, the movable partition between the front Meeting Room and the administrative offices at the rear does not provide sufficient acoustical privacy to the administrative offices when meetings (such as those of Girl Scout Troops) are held in the front of the building. Overall, however, according to the Recreation Department Director, the Girl Scout House satisfactorily meets the needs of the Recreation Department at present.

Accessibility Compliance. The building is visited by the public and must therefore be compliant with state accessibility codes and federal ADA accessibility standards. Although there is a ramp to the rear door at the entrance to the Recreation Department, much additional work is needed to bring the building into full compliance. Handicapped accessible parking is required. At present, the front entrance door to the Meeting Room is not accessible. The ramp to the rear door does not have compliant railings. Additionally, none of the existing toilet rooms are accessible. At least one of these toilet rooms should be reconfigured to be accessible.

Issues. In the past there has been discussion of alternative sites for the Recreation Department - including the Tarkiln Community Center or the old Duxbury Free Library. In the future, if the Old Town Hall is converted to a new Town Hall Annex, there may be space available there for the Recreation Department as well. These programmatic relocation options perhaps should be investigated and decided upon before the extent and nature of repairs are determined. However, the Recreation Department Director has expressed little desire or need to move from these current facilities.

North Hill Country Club

Merry Avenue

Jurisdiction: Recreation Department; Private management firm (Johnson Golf Management)

Description. The Country Club, located on 342 acres of land, offers cross-country skiing, hiking, picnicking, and horseback riding. Additionally, the nine-hole North Hill Golf Course includes the main clubhouse together with several ancillary buildings, including a private residence, a golf cart barn/covered picnic area, and two maintenance shacks. Plans currently exist to construct a new clubhouse and demolish the existing clubhouse.

North Hill Country Club: Club House

North Hill Country Club, Merry Avenue

Jurisdiction: Recreation Department; Private management firm for operations

Description. The existing clubhouse, approximately 3,000 square feet in size, is a two-story wood frame facility that serves as the clubhouse for the nine-hole golf course. The ground floor is primarily used for a restaurant and snack bar, small pro shop, and restrooms. A bar/lounge is located on the second floor together with a game room. The golf course and clubhouse is managed by a private management company.

Accessibility Compliance. This facility is used by the public, and must therefore meet state and federal accessibility requirements. At present, the building meets few accessibility standards. The building lacks accessible parking or exterior entry ramps. The second floor is inaccessible and requires an elevator to be made accessible; and, there are no accessible toilet rooms. The cost of bringing the building into compliance with current accessibility regulations and standards is considerable.

Issues. There has been discussion for years, of expanding the golf course from a nine hole to an eighteen hole facility on recreational land the Town already owns. To date, sufficient support for expansion has not been attained.

Additionally the existing clubhouse is inadequate and does not meet State and Federal accessibility standards. Extensive reconstruction would be required to bring the facility into compliance. Given these considerable costs, the Recreation Department has recommended to the Town administration and Town Meeting that the current clubhouse be demolished and a new one built.

At the Annual Town Meeting in 1998, the Town agreed to enter into a 10-year contract with operators of the course who would build a new clubhouse and turn over ownership of the clubhouse to the Town in 10 years. The Town will be responsible for the demolition of the old clubhouse. Final action on this contract currently depends on agreement of the septic system design.

North Hill Country Club: Family Dwelling House

North Hill Country Club, Merry Avenue

Jurisdiction: Recreation Department

Construction Date: 1938

Description. This two story frame house, approximately 3,474 square feet in size, is used by the Recreation Department to provide personnel housing. It is now used by the Superintendent of the private management firm. The building is stable, but show the effects of age and settlement. Extensive renovations have recently been accomplished - including the installation of a new heating system, a new roof, painting, and a new septic system. Other improvements, such as new windows, are still required, as well as some accessibility improvements.

North Hill Maintenance Barn

North Hill Country Club, Merry Avenue

Jurisdiction: Recreation Department

Construction Date: 1997

Description. A new one-story metal maintenance barn has been constructed with the past year

North Hill Cart Barn

North Hill Country Club, Merry Avenue

Jurisdiction: Recreation Department

Description. At present, there is a cart barn which can store 20 golf carts. A facility to accommodate 36 golf carts is required.

Percy Walker Pool

175 St. George Street

Jurisdiction: Recreation Department

Construction Date: 1973

Description. The Percy Walker facility houses an indoor pool, offices, locker rooms and restrooms - all approximately 14,695 square feet in size. The pool, locker rooms, shower rooms, and toilet rooms are housed in a one story building constructed of concrete block with a brick veneer. There is a partial basement approximately 1,505 square feet in size. The roof is constructed of wood beams and purlins with tectum sheet spans. The building is in fair to good condition.

Accessibility Compliance. Because the building is widely used by the public, it must comply with state and federal accessibility standards. At present, the building is not fully compliant with all these standards. It is, however, functionally accessible. Handicapped parking spaces must be added. The entry door thresholds must be modified, and the locker rooms and toilet rooms must be brought into compliance with current accessibility standards. There is a lift which functionally allows an individual to be lowered into the pool, however, it may not be fully compliant with current required accessibility standards.

Tarkiln Hall Community Center

245 Summer Street

Jurisdiction: Selectmen

Construction Date: 1910

Description. Tarkiln Hall formerly was a small two room schoolhouse. Tarkiln's two large rooms host such activities as a pre-school, evening coffee houses, crafts instruction, and meeting areas for various organizations such as Boy Scout and Girl Scout Troops. The building is a one story wood framed building, clad with clapboard siding, shingles and plywood. It includes a small mechanical basement. The building is in fair condition, but extensive exterior and interior renovations are required. Behind Tarkiln are two Little League Fields, a small playground, and tennis courts.

Accessibility Compliance. The building is not compliant with state and federal accessibility requirements. The building lacks handicapped parking spaces, a compliant exterior ramp, and accessible bathrooms. Almost none of the areas of this building are accessible.

Issues. The future programmatic use of this facility is uncertain. There had been suggestions of relocating the town's Council on Aging and Senior Center programs to the site of this facility. There has also been discussion of relocating Recreational Department programs to this site. That suggestion has now been discarded. Some have even suggested that youth programs and senior programs be combined at this location. The nature and extent of repairs to this facility should be determined by the future programmatic uses chosen.

Harbormaster Shack

Town Pier, Snug Harbor

Department: Harbormaster

Construction Date: 1979

Description. The Harbormaster's Office is a single story wood framed structure, clad in shingles, and approximately 260 square feet in size. Repairs are needed to some exterior shingles.

Accessibility Compliance. According to the Inventory and Building Inspection Report, accessibility requirements are not applicable to this facility.

Blue Fish River Storage Facility (former Fire Station)

E/S Washington Street

Jurisdiction: Harbormaster

Construction Date: 1910

Description. This 850 square foot two story wood framed structure had originally been used as a fire station. It is now used for storage by the Harbormaster. There is a 425 square foot garage on the ground floor and a 425 square foot upper floor. The building is clad with wood shingles.

Accessibility Compliance. According to the Inventory and Building Inspection Report, accessibility requirements are not applicable to this facility.

5.2 PUBLIC SCHOOLS

Introduction

In July of 1997 Duxbury reorganized grade levels and spaces throughout its school system to optimize the use of its facilities in accordance with current education facilities standards and optimal student population sizes, philosophies, and grade groupings. After this recent reorganization, the school system now includes four active schools: The High School, the Middle School, the Alden Elementary School and the Chandler Elementary School. Duxbury High School now accommodates grades 9-12. The Middle School accommodates grades 5 - 8. Alden Elementary School accommodates grades 3 and 4; and, the Chandler Elementary School has been organized as an early childhood center accommodating grades K - 2.

The Duxbury High School, Alden Elementary School, the Duxbury Middle School, the new Library, and the Percy Walker Swimming Pool form an "academic campus" around the Train Athletic Field off of St. George and Alden Streets. The Chandler Elementary School is located to the west of Route 3.

It should be noted that the School Committee has a facilities needs study underway which will help determine the future use of the School facilities based upon future enrollment projections.

School Enrollments & Projections

Over the five year period from 1991 through 1996, birth rates and school enrollments remained relatively stable. According to the Massachusetts Department of Education, public school enrollments were as follows from the years 1991 through 1998:

Table 5-1
Historic Public School Enrollments

Year	K-6	7-8	9-12	Annual % Change	Total
1991/92	1,573	416	733	0.1	2,722
1992/93	1,594	417	738	-1.4	2,709
1993/94	1,574	401	721	-0.5	2,696
1994/95	1,567	450	762	3.1	2,779
1995/96	1,539	470	781	0.0	2,790
1996/97	1,614	445	806	2.3	2,865
1997/98	1,628	461	833	2.0	2,922

School Department analysis in 1997 and 1998 continued to show school relative enrollment stability with only minor rates of growth in school aged population for the foreseeable future. Therefore, barring unforeseen events, Duxbury's current school facilities are judged sufficient to meet anticipated demand for the next five years or longer. Beyond that time frame, if additional school facilities are eventually needed, the Town has 22 acres of land available for future school construction.

Table 5-2
Projected School Enrollments

Year	K-6	7-8	9-12	Total
1998-99	1,625	491	842	2,958
1999-00	1,646	495	874	3,015
2000-01	1,695	508	875	3,078
2001-02	1,720	512	904	3,136
2002-03	1,777	499	946	3,222
2003-04.1	-	500	952	-
2004-05	-	528	953	-

Source: Duxbury School Department

Inventory of Schools

Duxbury High School (Grades 9-12)

150 St. George Street

Jurisdiction: School Department

Construction Date: 1968

Description. Duxbury High School (the Junior/Senior High School until July of 1997) is a large one and two story facility approximately 215,136 square feet in size. The first floor is 159,805 square feet in size and the second level includes 55,331 square feet. The High School includes grades 9 through 12 and in 1997-98 accommodates approximately 850 students. The capacity of the building is estimated to be 1,225-1,250 students. The School Department's administrative offices are located at the High School as well.

The building is a masonry load bearing structure with steel frame. There is an elevator. The building is in basically good condition with some rooftop HVAC units in need of replacement. Additionally, windows in the older part of the building will need to be replaced and the majority of the roof will need to be replaced within the next five years.

Accessibility Compliance. According to the Inventory and Building Inspection Report, there are significant accessibility deficiencies at the High School. The most significant corrections need to be made to the restrooms, locker rooms and shower rooms. Additionally, some improvements need to be made at building entryways to make them fully accessible and compliant as well as modifications needed to classrooms and laboratory rooms to make them accessible. Also, interior ramps must be reconfigured to make them compliant.

Duxbury Middle School (formerly Duxbury Elementary School) (Grades 5 - 8)

St. George Street

Jurisdiction: School Department

Construction Date: 1960, renovated 1996

Description. The school is approximately 150,220 square feet in size. The original school was a single story masonry and steel structure. The later addition of a two story structure included an elevator. The school hosts grades 5 - 8 and accommodated approximately 960 students in the school year 1997-98. Additionally, the school hosts local, state and federal elections and the Annual Town Meeting. Renovated in 1996, the building is in good to fair condition.

Accessibility Compliance. Prior to the 1996 renovation, extensive accessibility improvements were required. Interior ramps needed to be modified to bring them into compliance. Exterior entryway improvements were required; and significant modifications were needed to restrooms, locker rooms, shower rooms and classrooms to make them fully accessible. The Selectman endorsed plans to modify the building to make these facilities fully accessible and these improvements have been made.

Alden Elementary School (former Lower Alden School) (Grades 3 - 4)

Cushing Avenue

Jurisdiction: School Department

Description. The new Alden Elementary School, recently renovated and reopened in the former Lower Alden School, hosts the third and fourth grades and accommodates, in 1997-98, approximately 475 students. The building is a two-story, four level brick and steel structure.

Accessibility Compliance. The Alden School was recently renovated and reopened and is now fully accessible.

Chandler Elementary School (Grades Preschool - 2)

93 Chandler Street

Jurisdiction: School Department

Construction Date: 1968

Description. The Chandler Elementary School is approximately 68,525 square feet in size. The building hosts grades K - 2 and in 1997-98 accommodated 650 students. The School is a one story steel framed building. Exterior and interior walls are constructed of concrete block with brick veneer. The facility as a whole is in good to satisfactory condition, although windows need refurbishment.

Accessibility Compliance. The Inventory and Building Inspection Report notes that significant accessibility deficiencies exist at the Chandler School. Significant modifications will be required to make restrooms accessible, to make classroom doors accessible, and to bring interior ramps into compliance with current accessibility dimensional standards.

5.3 PLAYGROUNDS AND RECREATIONAL PLAYFIELDS

Introduction

Duxbury has long valued its active recreational and playfield spaces. Playing field usage has dramatically increased 120% from 1980 to 1996. Yet during this period of increased demand, only two new playfields were added throughout the Town. Within the last two years, a skateboard park was constructed behind the lower Alden School as well. Today, over 6,000 residents annually utilize Duxbury's playing fields and courts. Increasingly therefore, there is rising demand for additional recreational venues. To meet this increased demand for playfields, there is discussion of expanding the number of playfields and ball courts at Chandler Field and at North Hill where there is land available for such expansion. Before this can be accomplished, however, increased budgets must be approved, not only to construct new facilities, but also to provide ongoing maintenance and upkeep. (Some recreational and playing fields are Town-owned while others are School Department owned. All these playing fields are maintained by the Department of Lands and Natural Resources.)

All school facilities are flanked by playfields, and near these playfields are public tennis courts. On St. George Street, Train Field, together with the Percy Walker Pool, offers a community-wide campus style recreational complex. For residents in the western part of town, the playing fields and playgrounds at the Chandler School, the Tarkiln Community Center, and a small neighborhood playground at Union and Keene Streets offer active recreational opportunities.

Waterfront recreation is dominated by Duxbury Beach and boating opportunities at the Pier and elsewhere. Inland waters offer opportunities for sailing, canoeing and fishing.

Inventory

Wadsworth Road Playground

Tremont Street

Jurisdiction: Recreation Department

Description. The Wadsworth Road Playground is a large level field, approximately two acres in size, including one youth softball field, two tennis courts, and a playground. The playground was updated in 1998.

Island Creek Pond

Tobey Garden Street

Jurisdiction: Private

Description. This recreation area consists of a picnic area and small beach suitable for small boat launching.

Lincoln Street Playground

Lincoln Street

Jurisdiction: Recreation Department

Description. The Lincoln Street Playground, 3.5 acres in size, consists of one grassy regulation soccer field and a parking area.

Keene Street Playground

Keene Street

Jurisdiction: Recreation Department

Description. The Keene Street Playground, approximately one acre in size, includes one youth baseball field, two tennis courts, and two parking areas.

Tarkiln Field

Summer Street

Jurisdiction: Recreation Department

Description. Tarkiln Field, adjacent to the Tarkiln Community Center, is approximately 1.5 acres in size. It includes two tennis courts, a playground, and two Little League baseball fields.

Chandler Field

Chandler Street

Description. Chandler Field, six acres in size, and adjacent to the Chandler Elementary School, includes two regulation soccer fields, one lighted baseball field, three youth soccer fields, and a toddler playground (the only one in Duxbury) built by volunteers.

Arthur Train Athletic Field

Alden Street

Description. Train Field, six acres in size, and located between the former Duxbury Free Library and the Alden Schools, is a campus-like recreation area. It includes one baseball field, one lighted softball field, and two regulation soccer fields.

Skateboard Park

Alden Street

Description. A skateboard park was constructed behind the Lower Alden School.

Lower Alden Field

Alden Street

Description. Lower Alden Field is six acres in size. It includes two youth baseball fields, one 80 yard soccer field, three tennis courts, and a multipurpose playground.

Alden Elementary School Fields (now Middle School)

Alden Street

Description. These playfields, behind the elementary school and approximately 4 acres in size, include one softball field, one track, two street hockey courts, two basketball courts, and one multipurpose field.

Duxbury High School Playfields

Description. These playfields, behind the DHS, are approximately seven acres in size. They include one softball field, one football field / regulation track, one soccer field, one practice field, six tennis courts, and one multipurpose playfield.

Table 5-3
Summary of Town Playfield Facilities

<u>Facility</u>	<u>Size</u> <u>(acres)</u>	<u>Tennis</u> <u>Courts</u>	<u>Baseball/</u> <u>Softball</u> <u>Fields</u>	<u>Soccer</u> <u>Fields</u>	<u>Basketball</u> <u>Courts</u> <u>Fields</u>	<u>Field</u> <u>Hockey</u>	<u>Track</u>	<u>Playgrounds</u>
Wadsworth	2.0	2	1					1
Lincoln	3.5			1				
Keene	1.0	2	1					
Tarkiln	1.5	2	2					1
Chandler	6.0		1	5				1
Train	6.0		2	2				
Low. Alden	6.0	3	2	1				1
Elementary	4.0		1		2	2	1	
Duxbury HS	7.0	6	1	1			1*	
Skateboard Park								
Total	37.0	15	11	10	2	2	2	4

* Track and football field

Summary of Recreational Facilities Issues

According to the 1997 Open Space and Recreation Plan, all three town departments - Schools, Lands and Natural Resources, and Recreation - have recommended that recreational facilities,

specifically the playing fields, be managed by one department instead of a combination of the three.

Among the additional recreational needs considered by the Town, which are now lacking, are: playing fields for youth baseball, football, basketball, and soccer; improved playgrounds for pre-schoolers, an ice skating rink, and cross country trails.

5.4 WATER SUPPLY & SEWAGE DISPOSAL SYSTEMS

Introduction

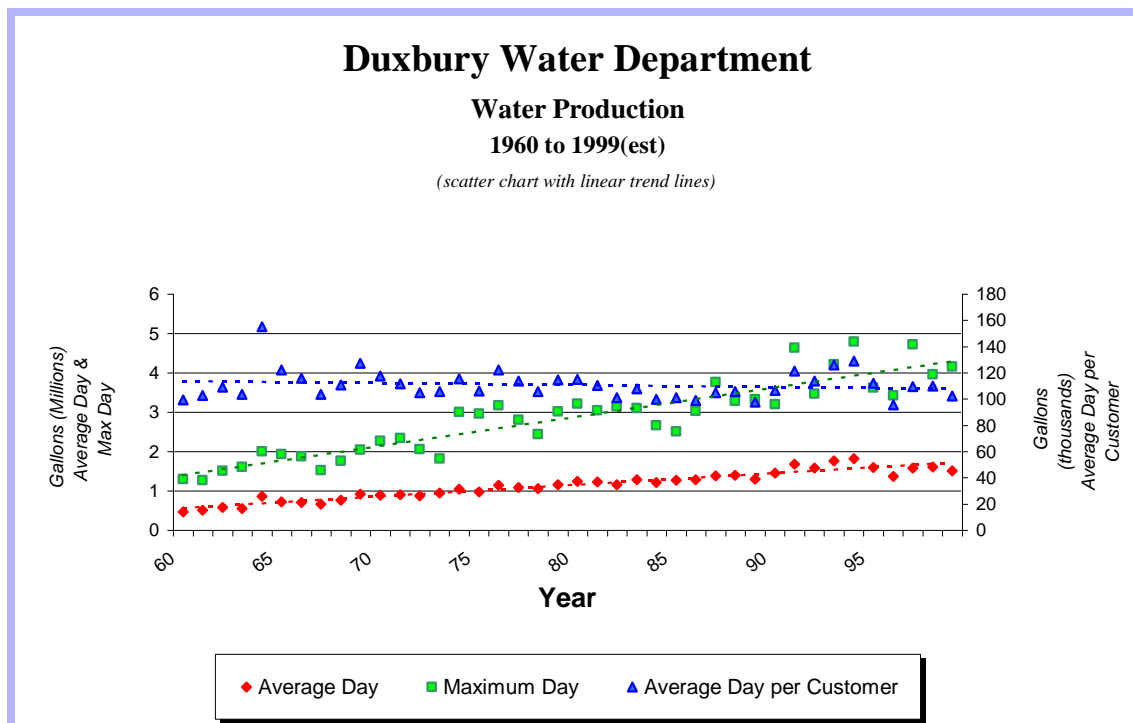
The availability and distribution of drinking water and sewage disposal facilities significantly influences Duxbury's ability to grow, and shapes development patterns throughout the town. If capacities are expanded, such additional capacity can open opportunities for additional growth. If capacities remain constrained, such constraints can act as tools for directing development. Therefore, the choices the town makes in regard to water supply and sewage disposal is a significant influence on Duxbury's future development.

Municipal Water System

As of December 1998 the Duxbury Water Department provided service for 5,310 residential and commercial customers, or approximately 90% of the Town's residents. The following sub-sections provide historic water use figures, identify key components of the Duxbury water system, and describe the town's water conservation efforts.

Water Demand

Shown below is a graph of the water production history from 1960 through 1999. The last year was estimated based upon the most recent monthly data. The average day production is shown at the bottom of the graph as a scatter chart along with a linear trend line suggesting a gradual growth over time for the average day production. Above that chart is a scatter chart of the maximum day values since 1960 with a linear trend line. A water utility needs to have adequate wells on line in order to meet the demand on that one day of the year when it is greatest. The variation of these values over time demonstrates the effect of rainfall and temperature over this demand whereas the average day values are less affected by these factors and therefore closer to the trend line. The "fit" of these trend lines to the data discussed above is very high suggesting that these trend lines can reasonably predict into the near future. The third scatter chart is the average day per customer values with a linear trend line, however the "fit" or "R squared" value is very low indicating that the trend line is unreliable as a future predictor. A review of this data suggests that water demand on a per customer basis is about the same in the recent past as it was in the sixties and seventies. This further suggests that future demand can be accurately predicted given values for future customers.



Water demand in Duxbury increased at a moderate rate in the ten years from 1989-1998. During this period, new connections to the system have been added at the rate of about 48 per year, or a 1.0-% annual growth in the customer base. Overall growth in the customer base from 1989-1998 was 10.0%, while growth in water use was 10.5%. Table 5-4 provides historic water use figures for Duxbury.

Table 5-4
Water Demand in Duxbury, 1989-1998.

Year	Number of Customers	Average Daily Use (1000s of GPD)	Maximum Daily Use (1000s of GPD)	Average Annual Consumption Per Customer (1000s of glns.)
1989	4,829	1,293	3,318	98
1990*	4,979	1,320	2,908	96
1991*	5,032	1,522	4,207	109
1992*	5,074	1,436	3,152	102
1993*	5,106	1,601	3,824	113
1994*	5,156	1,656	4,348	116
1995	5,201	1,452	3,294	101
1996	5,226	1,364	3,429	95
1997	5,266	1,582	4,720	110
1998	5,310	1,627	3,951	112

Source: Duxbury Water Department.

Notes: GPD = gallons per day. In starred years (1990-1995), water use figures have been adjusted downward by 10% to compensate for the over-registration of water use on town meters during that period. The metering problem has since been corrected.

Wells

Duxbury derives its water from ten gravel packed wells, as shown on Figure 3-3, *Water Resources*. Although these wells are adequate to meet present water demand, the Water Department is in the process of identifying additional wells to meet projected future increases in demand. Table 5-5 lists the capacity of Duxbury's ten municipal wells.

Table 5-5
Duxbury's Ten Public Water Supply Wells.

Pump Station	Capacity (GPM)	Capacity (GPD)
Partridge Road	240	230,400
Depot Street	400	384,000
Lake Shore Drive	350	336,000
Millbrook 2	350	336,000
Tremont 1	400	384,000
Tremont 2	300	288,000
Evergreen 1	600	576,000
Evergreen 2	500	480,000
Mayflower 1	500	480,000
Mayflower 2	<u>600</u>	<u>576,000</u>
TOTAL	4,240	4,070,400

Note: Daily capacity is based on 16 hours of pumping per day, the maximum rate recommended in order to extend equipment life and reduce the chance of water quality degradation. GPM = gallons per minute. GPD = gallons per day.

New Water Treatment Plant

The Town recently constructed a new water Treatment Plant on Evergreen Street adjacent to the Evergreen wells. The new plant will allow the Evergreen wells to be used for water supply to the Town. It is expected that this plant will provide 1,100 gallons per minute (GPM) of treated water.

Other Water System Infrastructure

Two water storage facilities in Duxbury augment the water supplied by well pumping, and provide a reliable water source for fire protection. These include the Birch Street Standpipe, which holds 1.0 million gallons, and the Captains Hill Reservoir, which holds 2.0 million gallons. These water storage facilities are necessary in order to provide continuous water service at times when the peak hourly demand exceeds the hourly pumping capacity of the wells and to improve water pressure.

As of 1996, the Duxbury Water Department maintained 117.9 miles of water mains 8" in diameter or greater. Every two years, the Department conducts a leak detection program on the entire system. The water system is 100% metered, and meters are read semi-annually.

The Duxbury Water Department currently owns or controls 232 acres of land near current and future water sources. In addition, wetlands and other open space lands in Duxbury protect the aquifer and well recharge zones. For the most part, Duxbury's wells are located away from the more densely developed portions of town along Bay Street and Washington Street. However, the

Depot Street and Partridge Road wells are located within a zone of relatively dense development and are surrounded by only small areas of protected land.

Future Identified Water Supplies

As noted in the above tables, the Duxbury Water Department currently has a capacity of 4,240 GPM to service 5,310 services or customers. Not all of this is available for peak day service in that some is off line due to water quality concerns (iron and nitrogen levels), some may be off line due to equipment repairs, and some needs to be available for helping to meet the 3,500 GPM fire flow demand which is largely serviced by the storage facilities. As evidenced by the existence in recent years of outdoor sprinkling water restrictions during the peak summer periods, the ability of this utility to meet normal peak day demands with its current well inventory is in question. Over the past four years, Duxbury Water Department peak day demand has averaged 0.52 GPM per service, and over the past twenty years this peak day average was 0.51 GPM. This suggests that for every 100 GPM of available future water supply, 200 future residential services could be served during our peak day demand for water during any one year, assuming none of this capacity is reserved for fire flow demands or other contingencies or to replace an existing well. In the most recent engineering report published in 1991 from Whitman & Howard, Inc., they identified five potential sites currently owned by the Duxbury Water Department. They are as follows:

Site	Gallons Per Minute Capacity
Church Street West	300
Church Street East	300
Island Creek Pond	500
Damon I	450
Damon II	<u>350</u>
TOTAL	1,900

The Island Creek Pond site has significant levels of iron in the water, and will probably require an iron treatment plant. The potential yield from this site is currently somewhat speculative. The total yield of these five sites suggests that they could serve 3,650 new residential houses provided that all of these facilities are regularly available for peak day production. In order to serve more new residents or other reserve or replacement requirements, new well sites would need to be identified. And if any of the current approved sites were lost due to regulatory withdrawal restrictions, new well sites would need to be identified to replace the lost sites. During the 1970s land holdings of adequate size for a public water supply well but owned by private owners were extensively examined, however public land holdings have not yet been explored for potential sites. Clearly buildout projections suggest a significant shortfall which can be served only if new sites are identified or if the current users reduce their peak day demand on the system.

Water Conservation Efforts

Water conservation in Duxbury is important for several reasons. First, Duxbury residents currently use 92 gallons of water per person per day, compared to 70 gallons for comparable communities elsewhere in the Commonwealth. Second, wasteful use of water will require the Town to invest in additional wells and other water supply infrastructure. New wells typically take several years to permit, develop, and bring into operation and cost as much as one million dollars each. Finally, excessive aquifer pumping can harm the environment by reducing freshwater supply to wetlands, streams, and ponds, and by promoting aquifer compaction and geological subsidence. These effects cause problems both for humans and for the natural communities that rely on freshwater resources. To save money and maximize environmental protection, the Duxbury Water Department administers an active water conservation program. Recent water conservation efforts in Duxbury have included the following measures:

Voluntary and mandatory limitations on the use of water for irrigation, including a prohibition on irrigation use during the hottest part of the day from 9:00 AM to 6:00 PM.

Distribution of a variety of water conservation pamphlets, including information on low-water landscaping, effective lawn-watering techniques, and household water conservation tips. This information is distributed semi-annually with the water bills.

100% metering of the town's residences, businesses, and other buildings to monitor water use and bill customers on a per-unit basis.

An increasing block rate billing structure (per-unit cost increases as water use increases) to promote conservation among the highest-use water customers.

Providing water customers with subsidized water saver kits, including low-flow shower heads and other fixtures.

Water Audits conducted on a regular basis to determine the amount of unaccounted-for water. Recent efforts have reduced unaccounted-for water from about 17% prior to 1995 to about 10% after 1995.

A leak detection program is conducted on a regular basis on water mains.

Sewage Disposal Systems

Currently, the vast majority of Duxbury is serviced by individual onsite sewage disposal systems. A small section of Duxbury is sewered and several areas are serviced by small, shared disposal systems.

At present, there are three shared sewage disposal systems. The first is located behind the Duxbury High School on Lover's Lane. There, a treatment plant is shared by the High School and other municipal buildings and schools centered around Saint George Street and Alden Street.

The second shared sewage disposal system is at the Snug Harbor business district where eleven buildings, including the Duxbury Yacht Club, are connected to a leaching field located under the Duxbury Yacht Club golf course on Harrison Street, at some distance from the harbor.

The third shared sewage disposal system is located along the Bluefish River. There, three buildings at the edge of the river are connected to a shared system with the leaching facility located at the newly renovated Ellison Center for the Arts. In the Snug Harbor and Bluefish River systems, the leaching sites were provided by private non-profit organizations. The Town of Duxbury served to facilitate the cooperative effort behind all three of these shared sewage disposal systems. These facilities were approved under the revised Massachusetts Title "5" regulations.

A limited area of Duxbury is sewerred. Buildings along Gurnet Road, at the north end of Duxbury Beach adjacent to the Town of Marshfield, are connected by municipal sewer to the Town of Marshfield Sewerage Treatment Plant. Additionally, the sewage from the Duxbury Town Pier boat pump-out station is transported to Marshfield for treatment, for which Duxbury pays a user fee.

5.5 GOALS AND POLICIES FOR PUBLIC FACILITIES AND SERVICES

Over the years, Duxbury has done an excellent job of providing superior town services, recreational opportunities, and municipal facilities. Particularly in recent years, an ambitious facilities and construction program for the library, schools, new water treatment plant, and renovations at Town Hall for additional meeting rooms have resolved many long-standing facilities needs. Since it is and has been an overarching goal of Duxbury's citizens over a sustained period of time to maintain superior municipal services, schools, and recreational opportunities to well serve its existing citizens, a continuation of its strong legacy of municipal services is likely to continue.

At this point in time, Duxbury has resolved a number of facilities and services needs for the foreseeable future due to its efforts cited above. A further opportunity to resolve remaining space needs and provide additional services now presents itself because several municipal facilities have either recently become available after new facilities replaced them (i.e. the old Library), or may become available in the future (i.e. if a new Senior Center is built and the Old Town Hall is vacated).

Over the years, Duxbury's citizens have consistently supported the betterment of town facilities and services as evidenced most recently by the recent opening of the new Duxbury Free Library, the recent reorganization of school grades and renovation of school facilities to support educational missions and space needs, the decision to reopen the Ashdod Fire Substation, and the current construction of a new Water Treatment Plant. Though watchful of scarce fiscal resources and unwarranted increases in property tax rates, citizens have nevertheless supported increased programs and facilities when such programs and facilities directly provide services used by most townspeople. Three of the most consistently supported goals have been 1) the protection of water supply resources to insure clean drinking water, 2) the support of a superior school system, and 3) the expansion of access to recreational opportunities when feasible.

Specifically, goals widely supported in the recent 1996 townwide survey and 1997 Strategic Planning Project included:

- Protection of the town's supply of clean drinking water.

- Support of a superior school system.
- Maintenance and enhancement of senior citizens services and facilities.
- Maintenance and expansion of playfields and other recreational venues to provide additional recreational opportunities.

Support for expansion of facilities and services most directly correspond to those services which immediately impact and most directly serve a majority of households and families - such as the school system, recreational opportunities, and public safety. Even needs such as the shortage of public meeting rooms have been evident to most of Duxbury's citizens. Other facilities needs, however, such as administrative space shortages of certain town departments, are less visible to the general public and therefore do not become evident as problem areas in need of support. The list of goals outlined below reflect both public opinion as well as an objective needs assessment after inspection of the Town's facilities and discussions with various Department Heads.

In areas where there are failing systems, planning must suggest recommendations that are solutions to the problem, not just recommendations that are popular with the public.

1. Administration of Town Government

- Provide adequate public meeting space for Town Boards, Committees, and community groups to overcome current shortages and scheduling conflicts even with the recent additions of new meeting room space at the new Free Library and the basement at Town Hall.
- Provide sufficient office space for various departments which now have shortages.
- Expand computer network linkages between Departments to share common databases and provide closer coordination between various Departmental actions.

2. Public Safety

- Provide shorter response times (approx. 4 minutes or less) by the Fire Department to fire alarms throughout the town.
- Provide better facilities for Fire Department personnel.
- Provide improved facilities for the Police Department's personnel and correct current deficiencies.

3. Senior Citizen Services

- Find permanent home for the Senior Center and Council on Aging. Provide adequate facilities to support current services for seniors as well as expanded programs.

4. Recreational Facilities and Services

- Add playfields.
- Add additional toddler playgrounds.
- Seek opportunities for expanded recreational venues not now provided in Duxbury.
- Improve services and facilities for the town's public golf course.
- Coordinate maintenance and management of various playgrounds and playfields.
- Where possible, seek to attract private sector participation in providing recreational opportunities, as is now done at North Hill, to reduce the burden of the Town's future capital budget and maintenance budget requirements.

5. School System

- Provide staff training and conference space for school department staff and faculty.
- Monitor school population growth to assess future facility needs.

6. Library

- Continue to expand the Library's book collection and on-line computer services to the public.

7. Public Works / Water Department / Cemetery Commission

- Plan for the eventual reconstruction of the existing Sewage Treatment Plant serving the municipal campus of schools and library on St. George Street and Alden Street to replace obsolescent technology.
- Continue to promote water conservation in Duxbury to minimize the need for additional new wells.
- Anticipate the need to add new furnaces to the crematory facility at the Mayflower Town Cemetery to meet anticipated increased demand for cremations.
- Upgrade and expand Water Department Garage.

8. Utilize Vacant or Surplus Town Facilities and Town-Owned Properties for Providing Increased Public Services

- Reuse the Old Free library to meet a community need.
- Reuse the Old Town Hall for Town Offices purposes if the Senior Center relocates

Based on goals expressed by Duxbury's citizens and an assessment of space and services needs conducted during this study, a number of recommendations are described below. These recommendations are consistent with Duxbury's longstanding commitment to providing superior municipal services. In some instances, where public opinion is divided on an issue, several options are presented. The Planning Board believes that the Town must be bound to the same rules and regulations as the general public unless Town Meeting approves otherwise.

5.6 PUBLIC FACILITIES AND SERVICES RECOMMENDATIONS

Primary Recommendations

1. Manage public lands in anticipation of future needs to provide public facilities and services.
2. Expand computer networks so that common databases and GIS mapping can be shared by all departments.
3. Coordinate maintenance and management of recreational facilities among various departments involved in recreation programs.
4. Develop and implement long range plan to meet future sewage and septage collection and treatment needs, including replacement of existing collection and treatment facilities.
5. Develop management plan for Town resources.

Secondary Recommendations

1. Review options for future Town Hall needs, including potential expansion into the Old Town Hall, if and when Council on Aging relocates from the building.
2. Renovate the personnel wing of Fire Headquarters to meet industry standards.
3. Investigate the feasibility of renovating and expanding the Police Station to eliminate space shortages and other deficiencies. Alternatively, investigate the construction of a combined Police/Fire/Public Safety building.
4. Evaluate the best long term use of the former Free Library building (currently being used by the School Department on a one year trial basis).
5. Encourage recreational uses for the Public such as horse farms and rings, ice-skating facilities, golf courses, and outdoor swimming facilities, which may have favorable economic impacts on the Town.

Section 6: TRANSPORTATION

Section 6: TRANSPORTATION INVENTORY & ANALYSIS

Introduction

This section begins with a general description of the transportation conditions that currently exist in the Town of Duxbury. An assessment is then made of the “balance” that presently exists between the transportation facilities and services available in the community, and the demands placed upon those facilities by the existing pattern and intensity of land development. This assessment answers three basic questions:

Do the current densities and intensities of development in Duxbury overwhelm the ability of the available and planned transportation services to provide an acceptable level of service?

Are the design and designation of streets in the community adequate for existing traffic levels, compatible with the abutting land uses, and/or consistent with the desired character of the community? and,

Has there been adequate planning for all transportation modes, including the street circulation system, transit, pedestrians and bicyclists?

Based on the assessment of current conditions, and the input of local residents and officials, a number of transportation-related goals and policies are next identified to ensure that a reasonable “balance” between land use and transportation will be maintained in the future. Finally, specific recommendations for modifying existing land use/zoning and improving the transportation infrastructure are made for Town consideration.

For any resident who has lived in Town for any length of time increased traffic stands out as one of the most salient signals of Duxbury’s growth and development. It becomes more difficult every year to hold on to the belief that the Town has “rural” or “summer home” character. There is less seasonal variation to our traffic patterns. There are more cars each year. Major streets are busier and with more fast moving vehicles. And parking in some of the commercial districts is distinctly more difficult on weekends.

These patterns began with the opening of Route 3 in the late 50’s. Traffic increases continued throughout the 70’s and 80’s as more people found it easier to commute to Boston and other South Shore business locations. Major shopping malls in nearby towns put ever-greater fast-moving traffic on Route 53, Route 3 and even Route 3A. More recently there has been a noticeable increase in traffic on streets like Lincoln, Franklin and Congress as commuters make their way to stations of the new South Shore Railroad.

Certainly these traffic patterns are not unusually bad. Residents that move here from other parts of the State and Country enjoy our somewhat relaxed approach to travel. But these increases in traffic should give us all early warnings of things to come.

6.1 OVERVIEW OF EXISTING TRANSPORTATION CONDITIONS

Travel Characteristics of Duxbury Residents

The travel patterns and use of alternate access modes by Duxbury residents are constantly changing. Table 6-1 identifies the travel or access modes that were available and used in 1990 by: a) Duxbury residents traveling to their workplaces, and b) those who resided elsewhere but worked in Duxbury. At that time, over 84% of all employed persons 16+ years old who did not work at home in Duxbury drove alone in their auto to their workplaces. While over 8 percent of Duxbury residents participated in commuter carpools or vanpool programs, transit usage overall was very low. Bus service was limited to several bus runs provided by the Plymouth & Brockton bus line, and subway service was available only by driving to the Braintree MBTA station and boarding the MBTA Red Line. Commuter rail and ferry services were not available or used. Not surprisingly, the travel modes chosen by those who resided elsewhere and worked in Duxbury mirrored those of Duxbury residents.

Today, Duxbury residents and workers continue to place a heavy reliance on the auto to reach their destinations. However, recent improvements in transit service to the region will undoubtedly increase the patronage of non-auto modes in the years ahead.

The Existing Street System in Duxbury

Located in the Greater Boston Metropolitan Area, Duxbury benefits from an excellent highway and major street system. Route 3 (Pilgrim Highway) bisects the town in a north-south direction and provides a direct route between Duxbury and communities to its north and south. State Route 3A (Tremont Street and Enterprise Street) and Bay Road also traverse Duxbury from north to south, serving as major travel routes between Marshfield and other coastal communities to the south. Travel east to west in Duxbury is accommodated by Route 14 (Congress Street west of Route 3; West Street east of Route 3); Route 139 (Church Street); and Route 53 (Kings Town Way and Summer Street); Elm Street, Franklin Street and Temple Street. In total, there are over 125 miles of highways and streets physically located within the Town of Duxbury.

Table 6-1
1990 Journey-to-Work Travel Modes in Duxbury

Travel Mode			Residents in Duxbury		Employees in Duxbury	
			# Persons*	% of Total	# Persons*	% of Total
AUTO	Auto:	Drive alone	5,377	84.2	2,504	85.4
	Carpool:	2-person	465	7.3	249	8.5
		3-person	28	0.4	17	0.6
		4-person	0	0.0	6	0.0
		5-person	0	0.0	0	0.0
		6-person	0	0.0	0	0.0
		7-9 person	0	0.0	0	0.0
		10+ person	45	0.7	0	0.0
NON-AUTO		Bus	165	2.6	8	0.3
		Streetcar	0	0.0	33	1.4
		Subway	62	1.0	10	0.3
		Commuter Rail	0	0.0	0	0.0
		Ferry	0	0.0	0	0.0
		Taxi	0	0.0	0	0.0
		Motorcycle	19	0.3	0	0.0
		Bicycle	35	0.5	19	0.6
		Walked	103	1.6	68	2.3
		Other	84	1.4	18	0.6
TOTAL			6,383	100.0	2,932	100.0

* Total includes all employed persons 16+ years old who do not work at home.

Source: 1990 Census and transportation data produced by the U.S. Bureau of Transportation Studies.
Prepared by the Data Center of the Metropolitan Area Planning Council (MAPC).

An inventory of conditions on Duxbury's streets has been compiled by the Massachusetts Highway Department (MHD) with the input of local officials. This Road File Inventory identifies the administrative bodies with jurisdiction over each street, the functional use of each street, as well as a host of other physical and operating characteristics.¹

Jurisdictional Classification of Duxbury Streets

The jurisdictional and functional classification of streets in the Town of Duxbury are important to understanding how streets relate to one another, who uses them, and who exercises control over changes that might be necessary on them. Within the geographical boundaries of Duxbury, there are 16.04 miles of roadway under the control of the Massachusetts Highway Department (MHD). The following streets or street segments fall under state jurisdiction:

Table 6-2
Massachusetts Highway Department Streets

¹ Massachusetts Highway Department, Bureau of Transportation Planning and Development, Road Inventory File. The Road Inventory File is maintained by the MHD/BTP&D as an important transportation planning tool. It contains information on roadway mileage, conditions, and numerous other characteristics (a total of 57 identifying characteristics are available for each roadway segment).

	<u>Street or Street Segment</u>	<u>Mileage</u>
Route 3	Pilgrim Highway	6.04
Route 14	Congress Street	0.32
Route 3A	Enterprise Street	0.91
Route 3A	Tremont Street	4.49
Route 53	Kings Town Way	1.19
Route 53	Summer Street	2.64
	Franklin Street	0.06
	Temple Street	0.06
	Elm Street	<u>0.33</u>
	Total	16.04

Of the remaining streets and roads within the Town borders, the vast majority - a total of 94.24 miles - are local roads under the jurisdiction of the Town of Duxbury. This means that the Town has assumed primary responsibility for their maintenance and safe operation. A total of 14.8 miles of road in Duxbury have not been accepted by the Town, and therefore remain under private ownership and control. The specific streets that fall under local or private control are identified in Appendix 6-1.

Functional Classification of Duxbury Streets

All streets in Duxbury are also classified on the basis of their functional use. The functional classification of a street is essentially a determination of the degree to which access functions are to be emphasized at the cost of the efficiency of movement, or discouraged to improve the movement function. As explanation, a street can serve two basic functions: it can provide access to individual parcels of land, or it can facilitate movements between various origins and destinations. A high level of access implies the existence of multiple driveways connecting the street with private property and making available part of the street for parking and loading. In contrast, a street that facilitates movement provides the capacity to move large quantities of vehicles and to do so at a reasonably high speed. These functions make competing demands on the street and thereby require that tradeoffs be made as to their relative importance.

Streets in Duxbury fall into one of four primary functional classifications or categories: principal arterial streets, minor arterial (or principal) streets, collector (or secondary) streets, or local (or minor) streets. The tradeoff between access and movement that is associated with each of these categories is defined below in Table 6-3, while the current classification of each street is shown on Figure 6-1.

As shown in Figure 6-1, Route 3 is the only principal arterial traversing Duxbury. Route 3A, sections of Route 14 (Congress Street) and West Street function as minor arterial streets directing travelers south and east from Route 3 toward the most densely populated eastern section of town. As major collectors, the following streets not only intersect with and carry traffic from local streets to the arterial streets, but are also used by through travelers.

Table 6-3
Street Functional Classification System

Principal Arterial Streets: A principal arterial street - such as Route 3 - is intended to provide a high degree of mobility and a low degree of land access. High capacity is obtained by providing wide cross-sections and/or by eliminating intersections by grade separation. In contrast with minor arterial streets, principal arterial streets serve longer trips and, therefore, should provide for higher speeds and levels of service. Principal arterial streets will typically interconnect major residential communities and other large activity centers within the urbanized area.

Minor Arterial or Principal Streets: Minor arterial streets are streets and roadways that also provide high levels of mobility and the low degrees of land access. However, most minor arterial streets will be at-grade and may intersect with a number of other public streets. The minor arterial system interconnects with and augments the major arterial system. It accommodates trips of somewhat shorter length and at lower operating speeds.

Under the Town of Duxbury Rules and Regulations Governing the Subdivision of Land, a minor arterial street is called a principal street. A principal street is a way that carries through traffic between parts of the town or between Duxbury and other Towns. Principal streets have a R.O.W. width of 60 feet.

Collector or Secondary Streets: Collectors are streets that penetrate neighborhoods, collecting traffic from local streets in the neighborhoods, and channeling it onto the arterial streets. A fair amount of through traffic and/or local bus routes may be carried on a major collector street; lesser amounts of through traffic and limited school bus services on minor collector streets.

Under the Town of Duxbury Rules and Regulations Governing the Subdivision of Land, a major collector street is called a secondary street. A secondary street is a way that carries through traffic to abutting lots and provides access to local and minor streets. A secondary street provides access to 11 or more lots, and has a R.O.W. width of 50 feet.

Local or Minor Streets: Local Streets are streets that primarily provide direct access to abutting land and access to the higher systems. They offer a low level of mobility and usually carry no bus routes. Service to through traffic is deliberately discouraged.

Under the Town of Duxbury Rules and Regulations Governing the Subdivision of Land, there are local and minor street classifications. A minor street is a way that provides access to 10 or less abutting lots, while a local street is defined as one that serves 3 or less lots and is not a through street. Both minor and local streets have a R.O.W. width of 50 feet.

Collector Streets

Summer Street (Route 53)	2.52 mi.	Washington Street	1.98 mi.
Franklin Street	1.73 mi.	Lincoln Street	2.02 mi.
Kings Town Way (Route 53)	1.19 mi.	Saint George Street	1.09 mi.

Church Street (Route 139) also functions as a major collector street - especially in the summer when used by non-residents to reach Canal Street in Marshfield and gain access to Duxbury Beach.

In terms of mileage, there are approximately 6 miles of principal arterial streets in Duxbury - i.e., Route 3 only - and 7.3 miles of minor arterial streets. Major collector streets represent 14.8 miles of roadway in the town; and there are 14.7 miles of minor collectors. The vast majority of roadway - 83.2 miles - are local streets. In order to protect their scenic and historic qualities, all public ways in Duxbury are designated "scenic roads" under the provisions of Massachusetts General Laws, Chapter 40, Section 15C. By virtue of this designation, any repair, maintenance, reconstruction, or paving along any road which involves the cutting or removal of trees, or the destruction of any portion of a stone wall, requires town approval.

Layout and Design of Duxbury Streets

In addition to functional class, the Road Inventory File for Duxbury also describes the basic geometry of each street or street segment in terms of such items as: a) the width (in feet) of the right-of-way (R.O.W.)²; b) the number of travel lanes; c) pavement and shoulder width and type; d) the structural condition of the road; and e) the existence of sidewalks. Except for Route 3 - a 2-lane directional arterial with median - there are no more than two travel lanes of varying widths on every street in the town.

Table 6-4 below summarizes and compares: a) the street geometry that actually exists on different types of streets in the town, with b) the right-of-way width and street design standards presently required under the Town of Duxbury's subdivision regulations, and c) the street design standards that have been adopted in other communities. As shown by the comparisons in Table 6-4, all of the different functional classes of streets are relatively narrow given their functional purpose³ - a condition that promotes the slowest possible travel speeds for the volume of vehicles being moved.

Table 6-4
Comparison of Street Conditions in Duxbury with Street Design Standards

	<u>Street Classification</u>	<u>R.O.W. Width</u>	<u>Pavement Width</u>
Typical Design Standard ¹	Local	50'-60'	22'-36'
	Collector	70'	36'-40'
	Arterial	-	-
Duxbury Subdivision Regulations ²	Local (local/minor)	50'	14'-18' min.
	Collector (secondary)	50'	22' min.
	Arterial (principal)	60'	22' min.
Existing Streets in Duxbury ³	Local	18'-60'	8'-24'
	Collector	30'-60'	18'-30'
	Arterial (minor)	40'-60'	22'-26'

¹ Institute of Transportation Engineers, *Recommended Guidelines for Subdivision Streets*, Washington, D.C., 1984.

² Town of Duxbury, Massachusetts, Rules and Regulations Governing the Subdivision of Land - Duxbury Planning Board, as most recently revised in December 1996, Section 7.0, Design and Construction Standards.

³ See Appendix A, Road Inventory File for Duxbury.

Traffic Congestion on Duxbury Streets

Average daily traffic (ADT) counts taken in recent years on Duxbury streets confirm the existence of low traffic volumes and minimal congestion. The average daily traffic recorded on Depot Street (south of Route 3A) in 1990 was 4,706 vehicles. Similarly, there were 4,947 daily vehicle trips made on Washington Street (north of Harrison Street) in 1990, and only 4,100 vehicle trips made during an average day on Route 3A (south of Duck Hill Road) in 1992.⁴

² Right-of-way refers to all publicly-owned land and thereby incorporates the roadway, sidewalk, grassy area, street trees, and/or public utilities.

³ See Homburger, W.S., et al, *Residential Street Design and Traffic Control*, ITE: Prentice Hall, 1989, Chapter 2, "Design of Local Streets and Traffic Characteristics", p. 23.

⁴ See Massachusetts Highway Department, *1992 Traffic Volumes for the Commonwealth of Massachusetts*, p. III-37.

More recent ADT volumes and/or hourly traffic volumes at peak periods of the day along Duxbury streets and intersection were not available for review. Nevertheless, field observations and discussions with local officials reveal that Duxbury streets do not experience the traffic congestion evident in many other communities. In general, there is more than ample capacity on the existing street system to efficiently move the existing volumes of traffic during peak as well as off-peak periods.

The absence of congestion problems on Duxbury streets is explained, in large part, by the location of the town on the coastline and its proximity to Route 3. The majority of through trips⁵ are carried on Route 3, and do not have to travel local streets. Through trips are trips that have neither an origin or destination in the community, i.e., trips that travel completely through the area. Through trips, rather than local trips made by residents of the area or workers and customers of local activity centers, are the primary causes of congestion in most communities.

The low level of traffic congestion is also explained by the fact that there are no major employment or activity centers in the Town to generate large volumes of traffic. The commercially-zoned areas that exist are small in size, located around the intersections of major streets, and occupied by types of uses that, with few exceptions, provide primarily for the service needs of local residents. It is noted that there is concern that the proposed widening of Route 3 through Duxbury⁶ will lead to increases in traffic congestion on Duxbury streets. It is highly unlikely that this will occur as long as Duxbury remains so heavily zoned for residential uses and the commercial areas remain small.

Intersection Congestion and Safety

While traffic flows relatively freely over Duxbury streets, potentially unsafe conditions are felt to exist at a number of intersections and/or along specific road segments. Although the frequency and type of actual accidents is available at this time, residents consider the potential for accidents - i.e., locations at which vehicle/vehicle and vehicle/pedestrian conflicts or “near misses” occur regularly - to be relatively high at the following locations. With one exception, the potentially dangerous locations identified by residents coincide with the areas zoned for commercial activity in Duxbury.

- Halls Corner: This is an unsignalized intersection (small rotary) in South Duxbury where Bay Road, Chestnut Street, Depot Street, Washington Street, and Standish Street all converge upon the primary commercial district in town.
- Snug Harbor Commercial District: The Snug Harbor business district - located in the vicinity of the Town Pier - contains the second largest concentration of commercial establishments in Duxbury. Periodic congestion (especially during the summer months) occurs along this section of Washington Street as motorists access the post office and many shops located there. Limited parking in the area also contributes to vehicular congestion on Washington Street.

⁵ A trip is a single or one-direction vehicle movement.

⁶ The Massachusetts Highway Department will soon initiate a preliminary design and environmental impact statement for the widening of Route 3 from Duxbury to Weymouth.

- Bennetts Corner: This 4-way, unsignalized intersection of Tremont Street (Route 3A) and Oak Street/Parks Street is the location of Bennetts General Store and the Bennett Tire Company. As allowed in all of the business districts, angle parking is allowed in front of Bennetts General Store. Access to the South Shore Cabinet & Appliance Center, and the First Church of Christ Scientist, are also located relatively close to the intersection.
- Bailey's Corner: The skewed intersection of Tremont Street (Route 3A), Chestnut Street, and Tobey Garden Street makes Bailey's Corner a difficult intersection to negotiate.
- Millbrook Area: The Millbrook business area is located on George Street between Alden Street and Tremont Street (Route 3A).
- Cox Corner: Like Halls Corner, the following five streets all converge upon this unsignalized intersection: Tremont Street and Enterprise Street (Route 3A), Church Street (Route 139 east from Route 3 and north into Marshfield), and Duck Hill Road. Periodic congestion occurs at this intersection as vehicles approaching from each of these streets negotiate their way, and patrons of the adjacent office building and auto sales store enter and exit the parking areas.
- Lincoln Street/West Street (Route 14) Intersection: Unlike the other locations described above, congestion occurs at this unsignalized intersection primarily during the morning commute as Duxbury residents travel Lincoln Street and West Street (Route 14) to access the entrance ramps to Route 3 and their workplace destinations to the north.

To address the vehicle/vehicle conflicts that arise from turning vehicles at the Lincoln Street/Route 14 intersection, the Town of Duxbury is planning to construct a traffic circle - also called a roundabout - to change the conflicts of traffic streams that now exist into weaving maneuvers. Although typically recommended for use only on residential non-arterial streets, the use of traffic circles has been found to reduce accidents by 50 - 90 percent when compared with two-way or four-way stop signs and traffic signals. It is understood that the roundabout being proposed at this intersection is currently at roughly 100% design stage, with construction likely to occur in 1999. No improvements are currently planned at any of the other locations.

The specific safety concerns at each of the above locations can be identified only by performing a detailed analysis of the frequency and cause of accidents at each location. In general, however, safe movements through many of the above intersections, as well as movements to and from adjacent commercial establishments, appear to be jeopardized not only by the convergence of so many roads, but also by the close proximity of access driveways to the operational areas of the intersections (e.g., the location of the Exxon station access drives at Halls Corner), and the unsafe movement of patrons into the intersection or street from angle parking spaces allowed to exist in front of the adjacent commercial establishments (e.g., parking in front of Dunkin' Donuts at Halls Corner). Every attempt should be made at intersections to minimize the number of vehicle/vehicle as well as vehicle/pedestrian conflicts by employing channelization and other physical separation techniques, by instituting strict access controls, or by controlling the location of parking. During subsequent phases of this study, it may be appropriate to review specific conditions at each intersection in greater detail and identify appropriate measures that would minimize conflicts and improve overall safety.

Existing Transit Services in the Area

According to the 1990 Census, approximately 25% of the workforce in Duxbury reside in the Town (see Duxbury Comprehensive Plan - Interim Report, Economic Characteristics, Table 8, p. 6). Primary workplace destinations outside of Duxbury include the Boston (18.6% of workforce), Quincy (6% of workforce), and Braintree (5.1% of workforce). Historically, these workers have had no choice but to rely on private autos to reach their workplaces. Recent improvements to the regional transit system, however, now make the above destinations much more accessible to these workers and other Duxbury residents.

Commuter Rail Service

In September 1997, the Massachusetts Bay Transportation Authority (MBTA) began providing commuter rail service to the South Shore by initiating service on the Kingston/Plymouth branch of the Old Colony rail lines. With commuter rail stations and parking in Plymouth on Route 3A at Cordage Park, and in Kingston at the intersection of Cranberry, Gallen, and Marion Drive (Exit 8 off Route 3), Duxbury residents can now avail themselves of these services by simply driving to the nearest rail station, parking (or drop-off), and boarding the train for destinations in the vicinity of any one of 8 station locations between Kingston/Plymouth and South Station in Boston. While service from Plymouth is limited, 11 trains depart and arrive at the Kingston station daily between the hours of approximately 5:30 AM (first departure) and 11:30 PM (last arrival).⁷ Travel time to Boston's South Station is approximately 1 hour at a cost of \$4.00/one-way trip. Residents living in west Duxbury may also find it convenient to utilize the new rail stations in Halifax (Garden Street off Route 36) or Hanson (Main Street at Route 27).

In light of the travel time spent to reach Boston by highway, and the cost of parking once there, travel by rail should be a very attractive and feasible access mode for many Duxbury residents. It is anticipated that a significant number of Duxbury residents with workplace destinations in Boston or other locations along the rail line will take advantage of this new rail service rather than risk the substantial time delays often associated with travel by highway north into Boston.

Fortunately, by locating the commuter rail stations in adjacent communities, Duxbury residents benefit from the improved accessibility offered by the service but do not suffer the negative impacts of increased traffic on Duxbury streets. By virtue of Duxbury's coastal location, and the strategic location of rail stations along Route 3, commuters from adjacent communities will not have to travel through Duxbury to reach the nearest rail stations. As a result, there is no reason to believe that traffic volumes on the Duxbury street system will change in response to this important transit improvement.

Bus Services

Regional bus service is currently being provided by the Plymouth and Brockton Street Railway Company between Duxbury and Boston with intermediate stops in Pembroke, Hanover, Norwell, and Rockland. Originating from Tarklin Apartments in Duxbury on Route 53, the existing P&B bus service schedule offers 6 bus runs (most with local stops) on weekdays in the Route 53 corridor north towards Boston. The Plymouth & Brockton also offers weekday bus service (2 bus runs) from Duxbury to Boston in the Route 3A corridor north through Marshfield.

⁷ Based on Old Colony Lines full service schedule, effective November 30, 1997.

Although bus service is available to Duxbury residents, it is not currently an integral part of the overall transportation network, nor is it likely to be in the future. It is not clear at this time whether the regional bus service routes provided by the Plymouth and Brockton bus line will remain viable, or be modified, in response to the competition for ridership associated with the newly opened Kingston/Plymouth commuter rail line. In addition, at only 1 dwelling unit per acre⁸, the density of residential development in the Town of Duxbury is not sufficient to support even a minimum level of local bus service (see box below). There are also no major employment

General Thresholds for the Initiation of Local Bus Service

A minimum level of bus service (20 daily bus trips in each direction or one bus per hour) is often provided in residential areas averaging 4-5 dwelling units per acre. typically, these residential densities correspond to gross population densities of 3,000 - 4,000 people per square mile. This level of bus service is suitable for non-residential concentrations of activities in the range of 5-8 million square feet of floor space, occasionally lower.

An intermediate level of local bus service (40 daily bus trips in each direction or one bus every half hour) can be provided in residential areas averaging 7 dwellings per acre (5,000 - 6,000 people per square mile) and for non-residential concentrations of activities from 8-20 million square feet.

A frequent level of local bus service (120 daily bus trips in each direction or one bus every ten minutes) is often provided in residential areas averaging 15 dwellings per acre (8,000 - 10,000 people per square mile) and for non-residential concentrations of activities from 20-50 million square feet.

Source: ITE, *A Toolbox for Alleviating Traffic Congestion*, p. 93.

centers in Duxbury that

would themselves justify the provision of local bus service. Except for a targeted shuttle bus service for the elderly in Duxbury, neither the population density nor the concentration of employment in Duxbury is sufficient to support even a minimum level of local bus service. These conditions are not expected to change in the future upon build-out within the town.

Commuter Ferry Services

Although not heavily patronized by Duxbury residents, access to workplaces in Boston is also available via MBTA commuter boat service that operates between the Hingham Shipyard (1,579 parking spaces) and Rowes Wharf in downtown Boston. Available only on weekdays, the 35 minute trip between Hingham and Boston is made roughly three times every hour starting at 6:00 AM through noon and at a lesser frequency between 3:00 - 7:00 PM. This service is operated by Harbor Cruises LLC in ferry boats with capacities of 150 and 300 persons.

The need to travel by auto to the Hingham Shipyard before boarding the ferry for the 35 minute trip to Boston places the ferry at a competitive disadvantage with commuter rail. Nonetheless, water transport represents yet another access mode (and very enjoyable one) that enhances even further the accessibility of the Duxbury community.

⁸ Assumes that there are approximately 5,600 dwelling units in the Town of Duxbury located on approximately 4,600 acres of residentially-zoned land.

Pedestrian Access in Duxbury

While the capacity of the street circulation system, and the availability of alternative modes of transport are important components of the comprehensive plan, so too are the special needs of pedestrians, bicyclists, and recreational roller bladers. Although the Bay Circuit Trail runs through a section of Duxbury, there are no designated routes or exclusive paths in Duxbury that have been set aside for use by town residents for walking, bicycling, or roller blading. There are walking areas scattered throughout town - e.g., Thaddeus Chandler Sanctuary, Trout Farm, Loring Cranberry Bog, Knapp Town Forest, Round Pond Trails, and the North Hill Wildlife Sanctuary - but no purposefully designed connections between them.⁹ Outside of these cultural walking areas, the absence of sidewalks and street lighting on major streets, as well as on many residential streets, discourages pedestrian movements and the benefits of recreation associated with their existence. More importantly, children and adults alike are now forced to share limited street space if walking or bicycling and, in so doing, expose themselves to undesirable safety risks.

In response to this deficiency, and to the support for sidewalks/bikepaths that was expressed in the recent Town survey of registered voters¹⁰ and the Duxbury Open Space and Recreation Plan,¹¹ a group of concerned residents formed the Duxbury Town Path Council in December 1997 with the expressed goals and objectives of identifying and developing a series of "multiple use paths" in Duxbury:

Duxbury Town Path Council

Goal: To create multiple-use paths between residential areas and popular destinations

Objectives: To establish pedestrian-bicycle-roller blade pathways connecting residential neighborhoods to schools, library, swimming pool, athletic fields, tennis courts, beach, town dock, maritime center, boat yards, historical society headquarters, yacht club, snug harbor shops, art center, art complex, museum houses, some trails and open spaces.

Clearly indicated by the Town Survey, an overwhelming majority of Duxbury's residents favor the addition of sidewalks/bikepaths for pedestrian safety. A strong desire to enhance accessibility throughout Town, increase safety for themselves as well as their children, health benefits, and alternative environmentally-friendly means of travel are widely shared and much desired goals. The challenge, however, is to devise practical ways to accomplish this that will be supported by Duxbury's citizens at Town Meeting.

⁹ See 1997 Duxbury Open Space and Recreation Plan, prepared by Duxbury Open Space Committee, February 10, 1997.

¹⁰ See Town of Duxbury, *Survey of Registered Voters for Long Range Planning Study*, Final Report, May 15, 1997. This survey indicated that, "64% (of the respondents) favor sidewalks/bike paths on major streets for pedestrian safety." (p. 15)

¹¹ The Five Year Action Plan recommends among its many goals and activities the need to "Develop a sidewalk/bike path expansion program," and to "Develop a plan for trail improvement of town owned and conservation land by Department of Public Works Crews."

The Duxbury Town Path Council, a private citizens group worked very hard to bring a proposal before the 1999 Annual Town Meeting. Although there was considerable support for the overall concept, the majority of voters did *not* support this particular proposal. Problems such as existing road widths, established property uses, specific routing and other factors lead to the failure of this specific proposal.

It is recommended that a Duxbury Town Path Study Committee be created as a *formal* Committee of the Town of Duxbury, to examine thoroughly the full range of options to improve pedestrian access and circulation throughout the Town. The Duxbury Town Path Study Committee should be charged to study the problem and develop recommendations to be brought before a future Annual Town Meeting. In this way, the Town can formally address this matter and thus maximize prospects of developing a plan that will be acceptable to the residents of Duxbury.

6.2 ASSESSMENT OF TRANSPORTATION FACILITIES AND SERVICES

Duxbury residents presently enjoy high levels of accessibility both within the town and the region. Unlike many communities, its strategic location in the region and attention to sound planning practices has resulted in a transportation system that is presently highly compatible with its land use plan. More specifically:

- Duxbury enjoys ready access to a major regional highway (Route 3) at two locations - Route 14 (exit 11) and Route 3A (exit 10). By virtue of Duxbury's coastal location, and the location of additional access ramps to Route 3 in adjoining communities, the majority of vehicle trips on Duxbury streets leading to and from Route 3 are local trips made by Duxbury residents, not through trips made by travelers from adjoining communities.
- Duxbury residents are also afforded a relatively high level of accessibility to Boston and other workplaces by virtue of their proximity to numerous transit alternatives - including a) the recently opened Kingston/Plymouth commuter rail line operated by the MBTA with stations in nearly Kingston and Plymouth, b) commuter boat services from Hingham, and c) regional bus services provided by the Plymouth and Brockton bus lines. The town is fortunate to have ready access to these alternative modes without the attendant traffic congestion and other problems (security, etc.) that would arise from their physical presence within the town.
- The existing street and circulation system in the Town of Duxbury is functionally well-designed. The overall street network includes a hierarchy of street types designed to accommodate through traffic, yet connected to the neighborhoods by a system of collectors and local streets. With few exceptions, local or residential streets are all linked to the larger traffic-carrying streets (collector and minor arterial streets) in a way that facilitates good access to other parts of the community and region. The hierarchy of street types that exists has arterial streets connecting with collectors, which in turn intersect with local streets. As a result, "unwanted traffic" on residential streets - i.e., traffic using the streets as shortcuts, detours, or overflow from a nearby congested arterial - is generally not a concern.
- With the exception of periodic "traffic jams" created by summer traffic seeking relief along its coastal roads, Duxbury does not experience consistent periods of traffic congestion on its local streets. The traffic generated by the current pattern and intensity of development in Duxbury is highly compatible with the size, configuration, and location of the existing street

system. The overwhelming residential character of the community - in combination with the scattering and small size of its business areas - generate minimal volumes of traffic and congestion on the local street network. With more than ample capacity on the local street system, traffic moves efficiently and safely without the need for excessive traffic controls. Only one traffic signal - at the intersection of Route 3A and Route 14 - exists within the entire town of Duxbury. In the absence of any significant congestion or consistent “bottleneck” locations, no major street improvement projects (i.e., street widening or new street segments) are warranted or planned.

- Street design standards are an effective and important tool available to communities to control the type and speed of vehicles on their street system and to promote a desired “character”. Fortunately, the geometry of existing streets in the town reflect an historical predisposition toward the construction of individual streets with relatively narrow pavements and travel lanes, regardless of their functional classification and use. Importantly, subdivision street design requirements recently adopted by the town reinforce this narrow street design - a condition that discourages unwanted through trips and traffic speeding on local roads. These street design requirements contribute in a very meaningful way to the “rural” and “semi-rural” character¹² of the town that is so important to Duxbury residents.
- Despite the absence of high traffic volumes, potentially dangerous conditions are felt to exist in the vicinity of a number of intersections and business districts - i.e., at Halls Corner, Snug Harbor commercial area, Cox Corner, Bennetts Corner, and the Millbrook area. The safety of movements through these locations appears to be affected principally by the location of the access drives to adjacent commercial establishments, and the type and location of parking allowed. Pedestrian movements are discouraged by the many conflict points that arise from the convergence of some many streets. To address these issues, consideration should be given to the development of more stringent site plan approval requirements and design guidelines. It may also be appropriate to consider retrofitting these locations with changed geometric street and intersection design elements and traffic controls.
- While auto and transit accessibility is relatively high in the Town of Duxbury, the needs of pedestrians (walkers, joggers) and bicyclists (also roller bladers) are not currently being met. Most major streets lack sidewalks. And although there are a series of walking areas (e.g., unpaved paths on town owned lands and sanctuaries) scattered across the town, there are no designated paths or trails that would provide safe connections between major destinations. As a result, children and adults alike are now forced to share limited street space if walking or bicycling and, in so doing, expose themselves to undesirable safety risks.

With the exception of the need to develop a sidewalk/path plan, the existing transportation system in Duxbury is in reasonable “balance” with its land use plan. However, the future development and occupancy of currently vacant or underutilized land in the town will generate new vehicle trips on the town street system, may increase vehicle congestion, and may create additional points of vehicle/pedestrian conflict. By controlling the location, type and intensity of uses in the town - through the Town’s zoning ordinance - it becomes possible to exert some

¹² In contrast, wide pavement widths and travel lanes enable higher speeds and facilitate the movements of larger motor vehicles (trucks, etc.) than do streets with narrow cross-sections. Wide rights-of-way, long sight distances, and large radii curves also facilitate driving at speeds that are not compatible with a pedestrian-oriented, “village-type” atmosphere. Excessively wide streets also present a formidable barrier for pedestrians to cross, especially by the elderly and children.

control over the traffic volumes that could contribute to future problem areas.

6.3 TRANSPORTATION GOALS

In order to avoid the three common transportation-related flaws of a Comprehensive Plan - i.e., mismatched land use and street circulation elements, inappropriately designated major streets or collectors, and inadequate planning for certain transportation needs - a community must enunciate clearly the transportation goals or planning concepts it would like to adhere to when developing its long-range plan and associated implementation policies, regulations, and programs.

Based upon the inputs of town officials and key community leaders, and the results of the 1996 town-wide survey of registered voters, it is believed that the following transportation goal and objectives capture the desired long-range intentions of the Duxbury community:

Goal: Study the roadway network, paying particular attention to vehicular traffic/ pedestrian conflicts.

Objectives: Encourage options for better management of traffic circles at Hall's Corner and other intersections in Town.

Encourage access linking of major public uses with private commercial uses to provide for easy circulation throughout the Town.

If this comprehensive plan is to be a truly effective planning tool, this goal and these objectives must be among those referenced by Duxbury officials in their day-to-day planning and decision-making, and serve as the basis for the Town's transportation-related programs, regulations, and policies.

Comprehensive plans receive their day-to-day expression in a series of policies and legal documents, the most important of which is the local zoning ordinance and map. Land use and transportation facilities in the Town of Duxbury are currently controlled and managed by the Duxbury Zoning Map (incorporating amendments as of April 1993), and the Town of Duxbury Zoning By-Laws (revised through March 17, 1997). The town zoning by-laws and map are important tools for transportation management because they control the permitted locations, densities, and intensities of various uses and their relationships to one another. They are the primary determinants of the number of trips that will be generated on the town street system, the modes of transportation that will be used, and the patterns of traffic flow likely to develop over time. Zoning requirements also influence the nature and extent of localized impacts by imposing requirements on the location and amount of parking and related services required for different land uses, typically during site plan review. In addition to its zoning requirements, the layout and design of new residential streets are further controlled by the Town of Duxbury Rules and Regulations Governing the Subdivision of Land (as most recently revised by the Duxbury Planning Board, December 1996).¹³

¹³ In Duxbury, the General By-Laws of the Town of Duxbury also play a small role in the management of local traffic by their designation of all public ways as "scenic" under the provisions of M.G.L., Chapter 40, Section 15.

The focus of future planning in the Town of Duxbury is not on finding ways to reduce existing traffic congestion and safety hazards on its street system, but rather on developing and implementing policies and plans that guarantee future avoidance of these problems. Our review of existing regulations reveals that Duxbury already has a number of important requirements in place to support the above goals. The following discussion summarizes these existing requirements while also suggesting other policies for consideration.

6.4 TRANSPORTATION RECOMMENDATIONS

Primary Recommendations

1. Resist development pressures that would increase the amount of commercially zoned land within the town; prohibit high traffic generators from locating in the business districts.
2. Develop appropriate plan to improve bike safety on existing roads.
3. Improve sidewalks and create multi-use path system between residential areas and popular destinations to meet the needs of pedestrians and bicyclists.
4. Strictly adhere to regulations relating to circulation, infrastructure, and traffic safety during the development review process.
5. Create more pedestrian friendly environments in business areas by regulating the location of access drives, controlling the location and number of parking spaces on each site, and requiring sidewalk connections between businesses and nearby residences.
6. Encourage the use of traffic calming techniques.

Secondary Recommendations

None.

Section 7: IMPLEMENTATION PLAN

Section 7: IMPLEMENTATION PLAN

The Implementation Plan specifies actions/strategies for specific boards, committees, and/or department heads to follow to implement the recommendations of the Comprehensive Plan. The Implementation Plan translates the recommendations of the Comprehensive Plan into specific actions within a suggested time frame. It is based on a strategy of priorities matched to the Town's ability to move along the recommended course. A plan of this kind gives the Planning Board, Board of Selectmen, Conservation Commission, and other Town boards, committees, and officials an overview of what should be done and a timeline for completion. It is not a rigid directive but a set of recommendations to follow. Thus, the time frame can be reviewed and modified based on completion of the recommendations.

The principal regulatory controls related to land use and development in Duxbury are the Zoning Bylaws, Zoning Map, Subdivision Rules and Regulations and the Board of Health Regulations. In order to implement the Comprehensive Plan recommendations, the zoning bylaw, the map, and the subdivision regulations will require changes over the next few years.

Appendix 7-1
Summary Schedule for Comprehensive Plan Implementation

1. Land Use

Recommendation	Action/Strategy	Department	Time Frame (Fiscal Year)
Zoning By-law revisions to reduce Build out Densities	Prepare recommendations for changes at Annual Town Meeting with input from Board of Selectmen and all other Land Use Departments	Planning Board	2001
Revise Cluster/PUD Sections of Zoning Bylaw	Complete review of applicable sections of Zoning Bylaw with recommendations for changes at Annual Town Meeting with input from Board of Selectmen and all other Land Use Departments	Planning Board	2001
Increase the amount of land in open space	Identify land for acquisition from the Open Space Plan	Conservation Commission	2000
Re-designate land west of Rte. 3 and North of Franklin Street from PD to RC	Prepare recommendations for changes at Annual Town Meeting with input from Board of Selectmen and all other Land Use Departments	Planning Board	2001
Establish requisite buffer areas within particular zoning districts	Prepare recommendations for changes at Annual Town Meeting with input from Board of Selectmen and all other Land Use Departments	Planning Board	2001

(continued)

(Appendix 7-1 continued)

2. Economic Base

Recommendation	Action/Strategy	Department	Time Frame (Fiscal Year)
Encourage compatible recreational or special residential uses that will yield net tax revenues or that offer a substantial public benefit to the Town provided they are compatible with existing residential uses and the environment	Encourage forms of residential development such as recreational uses, assisted living, or health care facilities that produce net tax revenue	Board of Selectmen/ Planning Board	2001
Improve and enforce design review procedures for nonresidential and multifamily uses	Adopt improved design review and site plan regulations	Planning Board/ Design Review Board	2001
Seek to accommodate (with appropriate design controls) shops and garages for small and medium sized trade, service companies, and contractors yards who serve town resident and business	Propose changes to Zoning Bylaw	Planning Board	2001
Review home business provisions of the Zoning Bylaw to ensure consistency with the Plan Goals	Study and prepare amendments to the Zoning Bylaw. Propose changes to Zoning Bylaw.	Planning Board	2001

(continued)

(Appendix 7-1 continued)

3. Natural & Cultural Resources

Recommendation	Action/Strategy	Department	Time Frame (Fiscal Year)
Identify parcels for open space acquisition in accordance with criteria listed in the 1997 Open Space and Recreation Plan	Identify open space parcels and implement the Open Space Plan	Conservation Commission	Ongoing
Further limit the uses allowed in the Zone II Aquifer Protection District	Planning Board draft changes to the Bylaw for the Aquifer Protection Overlay District and review water supply data	Planning Board	2002
Initiate a water quality monitoring program on Duxbury's major streams and watershed	Propose using South River Initiative and South Coastal Watershed	Planning Board/ Conservation Commission	Ongoing
Continue designating historic parts of the Town as Local Historic Districts or as National Register Historic Districts	Research grant opportunities	Historic Commission	2002
Develop a management plan for open space lands acquired by the Town	Research and develop plans	Board of Selectmen/ Conservation Commission	2002

(continued)

(Appendix 7-1 continued)

4. Housing

Recommendation	Action/Strategy	Department	Time Frame (Fiscal Year)
Develop proactive policies to address diverse housing needs within the Community	Consider revisions to the Zoning Bylaw and develop targeted opportunities for Special Needs Housing	Board of Selectmen/ Planning Board	2001
Review the in-law apartment provisions of the Zoning Bylaw to ensure consistency with Plan Goals	Review and revise Zoning Bylaw	Board of Selectmen/ Planning Board	2001
Improve data collection to determine special needs housing in the Community	Utilize Geographic Information Systems (GIS) and Assessor data	Planning Board/ Board of Selectmen	Ongoing
Seek to control “teardowns” by increased dimensional controls including possible new floor area ratio (FAR) regulations and lot coverage, height and yard requirements	Review and revise Zoning Bylaw	Planning Board	2001
Preserve the aesthetics and character of existing neighborhoods	Rules and Regulations, zoning bylaws, design review	Planning Board/Design Review Board	Ongoing

(continued)

(Appendix 7-1 continued)

5. Public Facilities & Services

Recommendations	Action/Strategy	Department	Time Frame (Fiscal Year)
Manage public lands in anticipation of future needs to provide public facilities and services	Utilize the Duxbury Capital Improvement Plan; complete an infrastructure plan	Board of Selectmen/School Committee	Ongoing
Expand computer networks so that common databases and GIS mapping can be shared by all departments	Develop, implement and acquire equipment	Board of Selectmen/MIS Department	Ongoing
Coordinate maintenance and management of recreational facilities among various departments involved in recreation programs	Renovate/rebuild where appropriate. Create management plan.	Board of Selectmen/School Department	2001
Develop and implement long range plan to meet future sewage and septage collection and treatment needs, including replacement of existing collection and treatment facilities	Develop plans to update and manage sewage and septage facilities	Board of Selectmen/Board of Health	2001
Develop management plan for Town Resources such as trails, etc.	Develop plans to manage lands and facilities	Town Manager/Board of Selectmen	2001

(continued)

(Appendix 7-1 continued)

6. Transportation

Recommendations	Action/Strategy	Department	Time Frame (Fiscal Year)
Resist development pressures that would increase the amount of commercially zoned land within the town; prohibit high traffic generators from locating in the business districts	Review permitted uses and dimensional requirements in Zoning By-law.	Planning Board	2001
Develop appropriate plan to improve bike safety on existing roads	Design and construct paths/evaluate options	Board of Selectmen/ DPW	2001
Improve sidewalks and create multi-use path system between residential areas and popular destinations to meet the needs of pedestrians and bicyclists	Evaluate options for sidewalks and multi-use pathways	Board of Selectmen	2001
Strictly adhere to regulations relating to circulation, infrastructure, and traffic safety during the development review process	Integrate into review provisions	Planning Board/Zoning Board of Appeals	Ongoing
Create more pedestrian friendly environments in business areas by regulating the location of access drives, controlling the location and number of parking spaces on each site, and requiring sidewalk connections between businesses and nearby residences	Integrate into review provisions and change zoning bylaws to reflect new design	Planning Board/Zoning Board of Appeals	Ongoing
Encourage use of traffic calming techniques	Integrate into review process and Subdivision Rules and Regulations	Planning Board/DPW	Ongoing

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