COMPREHENSIVE PLAN
TOWN OF WEST BRIDGEWATER, MASSACHUSETTS

December, 2001

Town Center/Greenbelt Plan

LARRY KOFF & ASSOCIATES
Community Planning

SEA CONSULTANTS
Engineering and Transportation

MARK BOBROWSKI, ESQUIRE
Zoning

BLUESTONE PLANNING GROUP
Design

Acknowledgements

October, 2001

Master Plan Advisory Committee

Eldon Moreira, Chairmen, Board of Selectmen
Victor Flaherty, Board of Selectmen
Richard Freitas, Board of Selectmen

William Turner, Chairman, Master Plan Committee
William Lucini, Vice Chairman
Hugh Hurley, Planning Board
James Henderson, Planning Board, Alternate, ZBA
Wilfred Howard
Grete Bohannon, Planning Board
John Decosta, ZBA
Gary Eliasson, Industrial Development Commission
David Lacy, Zoning By-law Study Committee
Robert Smith, Finance Committee

Town Departments

Accounting and Information Systems
Assessor
Board of Health
Building Department
Buildings & Grounds
Treasurer
Conservation Commission
Computer Advisory Committee
Council On Aging
Historical Society
Historical Commission
Fire Department
Parks and Forestry Superintendent
Police Department
School Committee
Town Clerk
Highway Department
Library Director
Water Commission

Assisted by:
Old Colony Planning Council
Open Space Committee

Elizabeth D. Faricy,
Administrator

TOWN OF WEST BRIDGEWATER
MASTER PLAN 2001

Protecting Our Town Character While Responding to the Challenge of Growth

TABLE OF CONTENTS

SECTION 4
NATURAL RESOURCES/OPEN SPACE

NATURAL RESOURCES/OPEN SPACE

EXECUTIVE SUMMARY

The natural environment in West Bridgewater is essential to the quality of life in the town. The agricultural lands and wide expanses of open space define the town's scenic rural character. Tremendous natural resources abound which are of regional importance, most notably the Hockomock Swamp, the largest continuous wetland in New England. Development pressures are mounting, and as land values rise, West Bridgewater stands to loose much of the open space and farm land which define its rural character. The Town has the opportunity to protect its important natural and open space resources from adverse impacts if active steps are taken prior to the encroachment of land use changes which threaten them.

Inventory

The Town of West Bridgewater is characterized by wetlands, woodlands, and flat, gently rolling farm fields and soils which are generally poorly drained and unsuitable for development. This ecology supports a special riverine as well as complementary forested environment of swamps and uplands which provide for the filtering and recharge of the groundwater and the maintenance of habitats for birds, animals and plants, of which several endangered species can be found in the town. This ecosystem is underlain and maintained by a single large, highly productive aquifer. The groundwater from this aquifer feeds three major ponds, six brooks, and numerous wetlands and small ponds, as well as providing drinking water to the town's residents and businesses. Together these natural resources contribute to the economy, natural setting, scenic rural setting and quality of life in West Bridgewater.

Issues

Many of the town's important natural resources are not permanently protected, and are likely be threatened by development in the future. While poor soils have constrained development, enhanced septic systems and continued development pressures could expand the areas with development potential, leading to a substantial increase in the town's population. Under a projected build-out, valuable resource areas would easily be lost or become overwhelmed by the pressures of development.

As one might expect in a rural area with limited public resources, the natural environment is not adequately protected by the existing set of regulations. One third of the 9,354 acres which comprise West Bridgewater are unprotected developable land. A significant percentage are actively farmed agricultural lands, which help to define the town's character. Ponds, riverine and upland habitats, vernal pools, wetlands, and other sensitive and scenic environmental areas are likewise not sufficiently protected. Possibly of greatest concern is the protection of the Town's water resources. Without appropriate development controls, these will become increasingly at risk from pollutants as increased traffic and developed land uses contribute contaminants through runoff and septic systems.

Goals

Six goals have been established to address the Town's concerns with conservation, resource protection, preservation of the town's rural character, and providing improved recreational facilities. Specific objectives relating to these goals become the basis for the open space plan.

Recommended Natural Resource, Open Space, & Recreation Plan

The Town needs to pursue the following three broad strategies ranked in order of importance in order to achieve the plan's goals. There was broad consensus amongst the Master Plan and Open Space Committees as well as the Conservation Commission that public awareness and the development of knowledge about environmental issues was the key to developing support for enforcement and acquisition.

1. PUBLIC AWARENESS AND COALITION BUILDING:

CRITICAL RESOURCES WHICH NEED PROTECTION

The Sensitive Natural Resource Diagram (Map 4-7) identifies the river corridors, related wetland, habitat, and public water supplies as the critical resource areas needing protection. Public awareness must be built around the important functions performed by these resources.

VISION PLAN

The West Bridgewater River Resource and Recreation Protection Vision Plan (Map 4-6) has been prepared to serve as a guide for the protection and expansion of open space and recreation resources. This Plan establishes priorities first, for resource protection, second for acquisition of open space and recreation areas, and third, for retaining important agricultural resources. This vision must be refined so as to build support for open space, recreation, and resource protection.

COALITION BUILDING AND COMMUNICATION: OPEN SPACE COMMITTEES

There is broad agreement that the Conservation Commission and Open Space Committee need to build coalitions with other town interests such as are represented on the Master Plan Committee. More opportunities to work together must be fostered.

2. PROTECTION OF RESOURCE AREAS

A number of regulatory strategies have been proposed to protect critical resources. These include both amendments to existing as well as new bylaws and regulations:

- Joint scoping of projects by various Boards.
- Protect water quality:
- Reform stormwater regulations (Zoning, Subdivision Regulations, BOH, CC)
- Address wastewater issues
- Nitrogen/Phosphorous Loading: Zoning and/or Board of Health
- Protect habitat areas: Establish a Resource Protection District, reform CC and Planning regulations
- Development of strategies to preserve farmland and open spaces: cluster subdivisions
- Prepare a resource protection plan for the Manley Street Industrial area
- Increase buffers to protect uplands related to resource areas

3. ACQUISITION OF OPEN SPACE PRIORITY PARCELS

Third, the town needs to establish priorities for open space protection, e.g., resource areas, agricultural areas, future sites for recreation, historic and scenic resources. Appendix 4-7 includes a list of 13 critical open space/resource sub areas identified which cover some 1,000 acres as priorities in the Open Space Plan. An evaluation should be undertaken to establish parcel priority. A matrix has been included to assist in this process. Given other priorities, (agriculture, recreation, scenic and historic, this list might need to be expanded.) Due to projected population growth, the Town may need to acquire 100 acres for active recreation purposes. In terms of protecting farmland, some percentage of the remaining 815 acres which are still in Chapter 61A protection, might receive additional consideration for protection.

Table 4-1
Regulations Impacting Natural Resource Areas

	Zoning	Subdivision Regulations	Conservation Commission Bylaw		State Regulations	Federal Regulations
Wetlands		-	100' buffer (flexible) 50' (firm)	150' buffer for septic systems	Wetlands Protection Act: 100' buffer (flexible)	Clean Water Act: Devel. subject to EPA review
	ACEC regulation to minimize impervious surface, require cluster, buffers		200' buffer (flexible) 100' buffer (firm)	Increase buffer to 200'	Stronger enforcement by Con.Comm.	
Rivers	-	-	100' buffer (flexible) No alteration of resource (firm)	150' buffer for septic systems	River Protection Act: 200' buffer (flexible)	CWA: Development subject to EPA review
			300' buffer (flexible) 100' buffer (firm)	Increase buffer to 200'		
Ponds	-	-	100' buffer (flexible) No alteration of resource (firm)	150' buffer for septic systems		CWA: Development subject to EPA review
			200' buffer (flexible) 100' buffer (firm)	Increase buffer to 200'		
Banks			100' buffer (flexible) 50' (firm)			
Habitats & Ecosystems	-	Aavoid disturbing habitats & natural features	-	-	Sensitive resources designations (development with state/federal funding subject to agency review)	
			Vernal pools protection, habitat protection		Certify vernal pools, designate ACEC	
Flood Areas	Within FEMA Zone A, no development that results in increased flood level.	-	Land subject to flooding in 100 year storm (firm)	-		FEMA: Flood Insurance Program, standards for minimum local regulation
Groundwater	Overlay districts, regulates development near public well sites and in contributing areas.	Drainage (storm-water) and sewerage regulations		Septic system design standards, min. 200' from wellhead for septic	Title 5: Buffer and performance requirements for septic systems. Aquifer Protection: Zone 2., limited protection	Safe Drinking Water Act: Regulates drinking water contaminants, review of federally funded projects in Sole Source Aquifer
	Stormwater performance standards	Stormwater performance standards	Stormwater performance standards	Max nutrient loading and Stormwater standards	Use actual recharge zones instead of radius for wellhead protection.	
Other		Req. for trees	-	-		

Existing
Recommended

Other: Recommended: Major Site Plan review, Improved cluster, Reduce boundaries of Industrial Districts

Firm = No development permitted, Flexible = Subject to review of regulating agency

4.1 INVENTORY[1]

NATURAL RESOURCES

Situated in the low-point of the regional watershed with elevations rising towards the northeast in the range of 80 to 100 feet above sea level, West Bridgewater is characterized by low flatlands, separated by gentle hills and spotted with wetlands throughout the town.

Soils and Elevations

- Erosion from the natural meander of rivers is much more of a factor than erosion from steep slopes, which are virtually absent in West Bridgewater.
- Due to West Bridgewater's glacial history, the soil composition tends to be erratic and can vary tremendously in short distances. The variations require on-site sampling to obtain accurate identification of soil suitability.
- The soils are well suited for agriculture, but in many places are unsuitable for septic systems because they are poorly drained. Despite limitations, however, development may still take place in many areas if property values are sufficient to make feasible the use of alternative technologies or shared treatment systems.

Surficial geology and soils analysis provide two methods for classifying soil quality, resulting in similar conclusions regarding the capacity for development in areas throughout the town.

Surficial Geology

Unsorted glacial till, a mixture of silt, sand, clay, and gravel comprise up to 45% of the surficial deposits. Till is typically unpermeable, with seasonally high water tables that can cause septic systems to fail, and an abundance of rocks, stones and boulders which make construction of playing fields and structures difficult.

Stratified beds of fine sand, silt and clay cover approximately 25% of the town. Slow permeability often causes water to stand over silt and clay deposits, making them extremely poor for development and better suited for conservation land.

Fine to coarse sand deposits cover another 25% of the town. These soils are well drained, and typically form level terrain. Much of this land has been developed for residential or commercial uses because of its minimal limitations. Approximately 5% of the town, an area surrounding the intersection of Routes 24 and 106, contains coarse sand and gravel deposits, which are ineffective at filtering out pollutants before reaching the aquifer.

Bedrock: Up to 100 feet of glacial till and outwash cover the vast majority of bedrock in West Bridgewater. Outcrops of bedrock are extremely rare, posing few development constraints.

Soils

West Bridgewater contains a varying pattern of soil types as classified by the Natural Resources Conservation Service (NRCS). These have been placed into four hydrologic groupings based on permeability. (Hydrologic groups are used in equations that estimate runoff from rainfall.) The soils in these groupings also have similar development potential. See Map 4-1.

[1] The Town's 1999 Open Space and Recreation Plan provides an extensive description of the town's natural environment, from which much of the following inventory is derived.

"A" Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well drained to excessively well-drained sands or gravels. Soils are most closely associated with aquifer recharge. These soils have high potential for development.

"B" Soils having moderate infiltration rates, consisting chiefly of moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures. Good development potential if mounding or other septic treatment alternatives employed.

"C" Soils having slow infiltration rates, consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures. Seasonally high water tables and septic constraints limit development capability.

"D" Soils having very slow infiltration rates, consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. Very severe constraints for development.

Water Resources

The higher elevations to the north drain into West Bridgewater, creating a river system that is part of the Taunton River watershed. See Map 4-2, Water Resources.

West Bridgewater's ponds, rivers and wetlands are a treasure and account for much of the appeal of the area. Besides providing a plentiful supply of drinking water and opportunities for hunting, swimming, boating, water-skiing, skating and fishing, these resources are the primary habitat for a rich array of plants and animals.

Rivers

West Bridgewater is in the Taunton River Basin; all rivers eventually empty into the Taunton River in Bridgewater. Rivers and brooks in West Bridgewater generally have gently sloping banks and large floodplains.

The *Town River* begins at Lake Nippenicket in the Bridgewater portion of the Hockomock Swamp and flows northeasterly through West Bridgwater. It drains most of the town, and its adjacent meadows provide some of West Bridgewater's most handsome and characteristic landscape. The Town River also provides West Bridgewater with a link to the Wampanoag Canoe Passage.

Coweeset Brook runs parallel to the town's western boundary and flows into the Hockomock River in the southwestern part of the town.

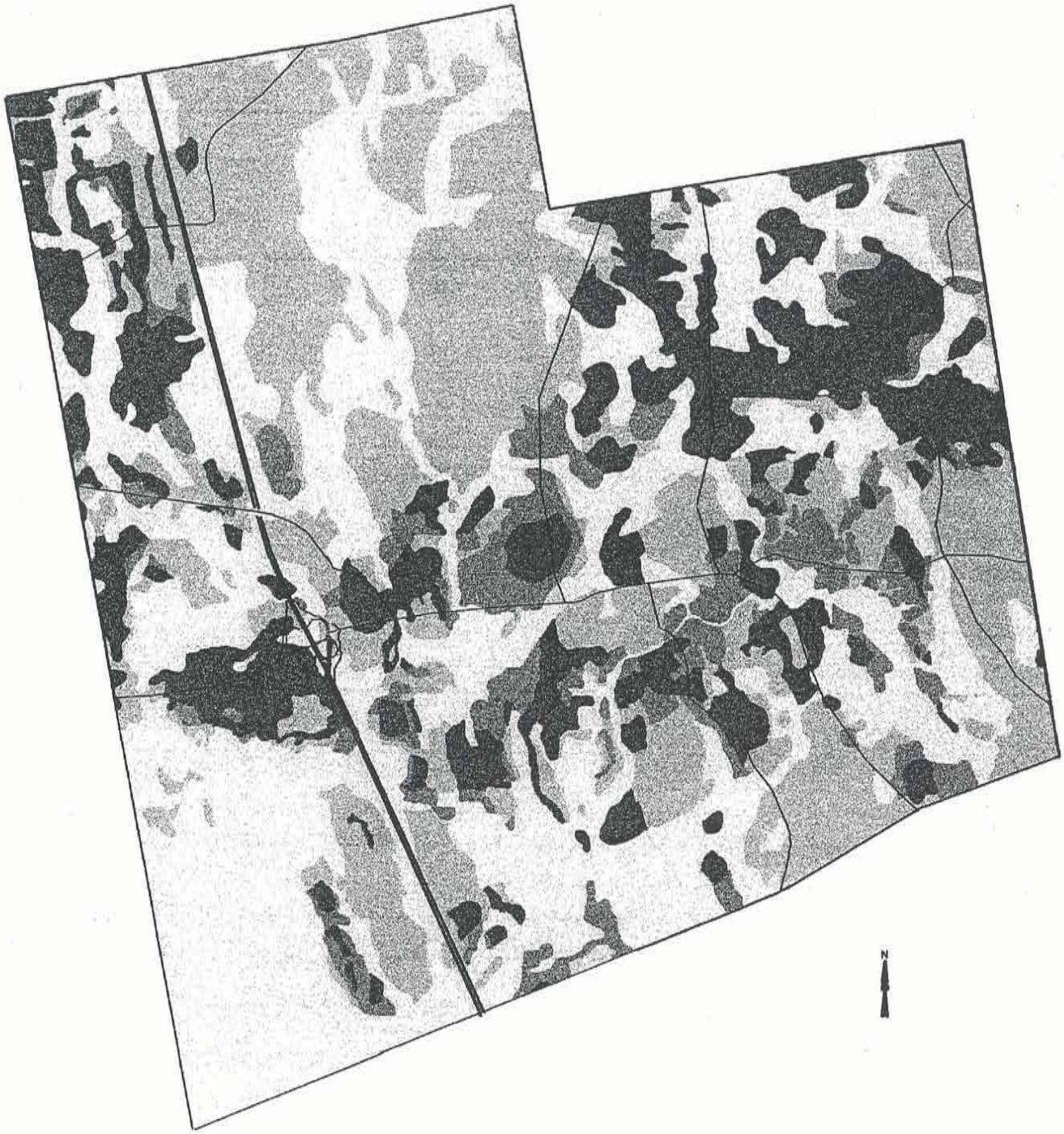
Hockomock River and *West Meadow Brook* flow into the Town River along the town's southern boundary at separate points.

Salisbury Plain River flows through the northeastern corner of town.

Willow Brook, One-Mile Brook, Black Betty Brook and *Bragas Brook* are intermittent streams that begin in Brockton and flow through the northern part of town into the state forest.

- According to the 1978 Old Colony Region Section 208 Regional Wastewater Management Plan, surface water quality in West Meadow Brook meets the goals of fishable/swimmable waters.

- Water quality problems were observed in other streams caused by agricultural runoff in the Hockomock River, failing septic systems and agricultural runoff along the Town River and Coweeset Brook, and effluent from the Brockton Sewage Treatment plant, which historically



Map 4-1

Soil Quality

Plymouth County NRCS

Town of West Bridgewater
Master Plan

Prepared by Larry Koff & Associates

- "A" - Soils with high development potential
- "B" - Soils with potential for development if septic constraints overcome
- "C" - Soils with severe development constraints
- "D" - Soils with very severe development constraints

caused significant odor problems in the summer months. These threats still exist, although the problem of effluent from the Brockton sewage treatment plant has been alleviated by expanded treatment and cleanup programs.

Ponds

Of the numerous small ponds in West Bridgewater, the three largest are Mill Pond, West Meadow Pond, and Town River Pond. These three ponds lie within dammed river systems. Access is limited to most of West Bridgewater's ponds.

Mill Pond is north of Crescent Street and south of West Meadow Pond. Its elevation is 75feet, maximum depth is 7 feet, and the pond covers 8 acres. Much of the pond is town-owned but the spillway and dam area at the base of the pond is privately owned. Access is limited to one location near the southern tip of the pond.

West Meadow Pond, which lies within the state forest directly north and upstream of Mill Pond, is at an elevation of 85 feet, with a maximum depth of 5 feet and comprises 25 acres. It is used for boating, fishing, ice fishing, and skating. It is buffered by the state forest and an extensive wetland system, providing filtration from agricultural or road runoff. Access is limited to two poorly marked entrances to the southwest.

Town River Pond is located in the southeastern section of town. Its elevation is 45 feet and covers 18 acres, with a town-owned canoe ramp on the western side of the pond (Reynolds Landing). The proximity to the commercial center of town, Routes 28 and 106, and a new 18-hole golf course with virtually no buffer area between the golf course and the wildlife puts the Town River Pond in danger of contamination from pesticide, herbicide, and fertilizer runoff.

Wetlands

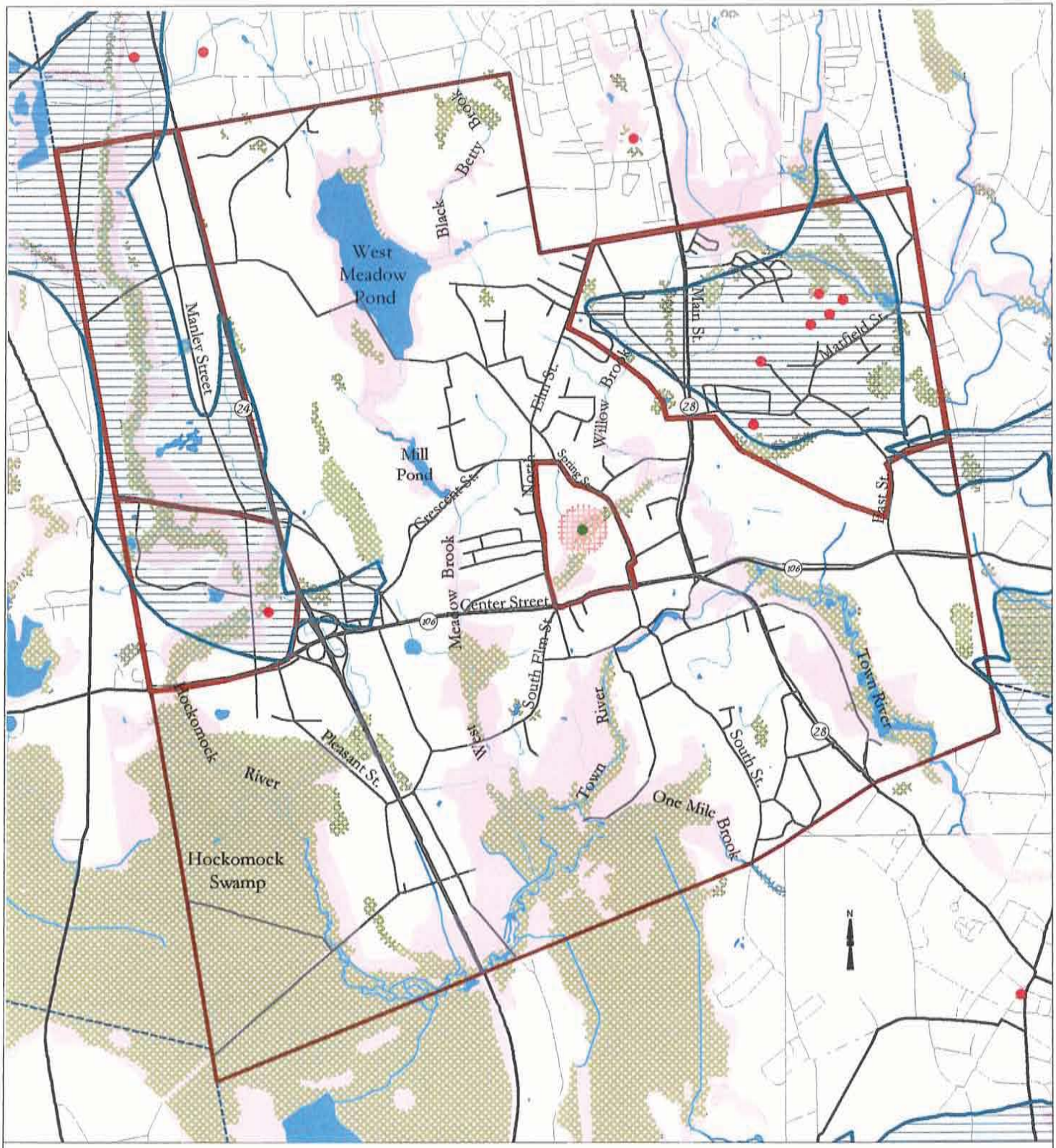
Approximately 30% of West Bridgewater is composed of wetlands which are found throughout low-lying areas and in many locations with poorly drained soils. These wetlands are important to the town as wildlife habitat, for water recharge, and to reduce flooding in developed areas downstream.

- There are many wetlands of varying sizes throughout the town, but the largest are concentrated in the southwestern part of the town, comprising part of the Hockomock Swamp, and the West Meadow Wildlife Area in the north.

Hockomock Swamp is the largest swamp in New England

- Covers some 16,900 acres and extends into Raynham, Easton, and Bridgewater.
- Recharges the underlying aquifer and drains into the Town River, which flows through the center of West Bridgewater.
- Was designated am "Area of Critical Environmental Concern" (ACEC) by the Department of Environmental Management.. Approximately 1,189 acres lie in the southwest quadrant of West Bridgewater, of which 889 acres is owned either by the State or the Town.
- Much of the area has been zoned for industrial use. Although protected under the Massachusetts Wetlands Protection Act and by its ACEC designation, outlying parts of the wetland could potentially be impacted by future development.

Vernal pools are isolated wetlands that fill with water only during the west test times of the year. These pools are critical habitat for frogs, salamanders, and other amphibians. Although many are estimated to exist in West Bridgewater, only two have been certified by the Massachusetts Division of Fisheries and Wildlife.



Map 4-2

Water Resources

2000 0 2000 4000 Feet

Town of West Bridgewater Master Plan

Prepared by Larry Koff & Associates

- Water Resource Protection District (Zones II and III)
- DEP Zone IIs (Wellhead Protection Areas)
- Wetland
- Flood Zone (FEMA)
- Surface Water
- Public Water Supply Points
- Site of Potential Water Source (Unprotected)

Floodplains

Areas subject to flooding in West Bridgewater are typically found along the rivers and brooks in town. These areas are defined by the Federal Emergency Management Agency (FEMA). Protecting the floodplains, including wetlands, is integral to protecting West Bridgewater from serious flood damage. These areas serve to retain storm water during and after precipitation and snow melt, and often coincide with wetlands.

Any development within the floodplain that causes a loss in flood storage must be compensated with flood storage elsewhere within the flood plain so the water retaining capacity is not lost.

Groundwater

The town's high-quality groundwater is one of the most important elements of West Bridgewater's infrastructure.

The citizens of West Bridgewater depend solely on groundwater as a town water source. A single aquifer lies beneath approximately 65% of the town. Residences and farms threaten the aquifer through the use of garden and lawn herbicides, pesticides, and fertilizers that can contaminate the water supply. Road salt and effluent from septic systems containing nitrogen and heavy metals could also be serious threats to the aquifer.

- In 1996, Zone II overlay districts were created around the cluster of 5 well sites in the northeastern part of town and the Manley Street Well located west of Route 24. The Zone II overlay districts protect the well recharge portions of the aquifer by not allowing commercial enterprises that are potential sources of groundwater contamination such as car wash, dry cleaning business, or any type of outside fuel storage.
- Reliance on the Manley Street Well has decreased significantly due to the proximity of its recharge area to Route 24 and the industrial-zoned portion of town. The recharge area for the five well sites in the northeastern portion of the town includes densely populated areas.
- The Robery farm site was purchased by the town for use as a new well site. A Zone II overlay area has not yet been delineated for this new well. High density housing is located around this new well site, which emphasizes the need for heightened protection within this recharge area.

Habitats

Open fields, woodlands, forested wetlands, and emergent wetlands comprise approximately 65% of the town of West Bridgewater today.

The town's waters, wetlands and uplands provide homes to numerous species of animals, which in turn are the basis of recreational opportunities for West Bridgewater's residents. The 1999 Open Space and Recreation Plan provides a detailed description of vegetative and animal habitats throughout the town. Map 4-3, Habitats and Ecosystems, depicts areas in West Bridgewater which have been identified as sensitive natural habitats, as well as sites which are thought to be home to vernal pools or rare and endangered wildlife species.

With the exception of some wetlands, most of the present vegetation is second growth. The various kinds of vegetation offer high quality recreational opportunities, scenic value, soil stability, as well as ideal habitats for wildlife which can be a benefit to recreational hunters.

Much of West Bridgewater is privately owned woodland, which provides a habitat for numerous species of animals and birds, as well as recreational opportunities for those who have access. This woodland consists of dry upland sites, mesic sites, and wooded swamp.

Rare and endangered plants include the Long's bulrush and Atlantic White Cedar swamp community. Long's bulrush depends on fire and seasonal low moisture for flowering, but is threatened by changes in hydrology, lack of natural fires, and competition from the invasive exotic purple loosestrife. Atlantic white cedars provide valuable habitat to many threatened animal species. The Massachusetts Division of Fish and Wildlife recommends no clearing or filling of Atlantic white cedar swamps.

- West Bridgewater retains a significant amount of productive wildlife habitat, largely because of the pockets of forested, shrub, and emergent wetland habitats found in proximity to the streams scattered throughout the town. The mixture of wetlands, mature second-growth forest, farmland, and abandoned farmland in various stages of regrowth results in a large amount of critically important "edge" habitat.

Edge habitat is where two habitat types meet and encourage larger wildlife populations of greater species variety.

Four rare and endangered animal species that have been identified in West Bridgewater include the king rail bird, the blue spotted salamander, spotted turtle, and Hessel's hairstreak butterfly. These species inhabit wetland habitats for part or all of their life cycles.

Habitat fragmentation, which is the leading source of plant and animal species extinction, has occurred in West Bridgewater where development such as housing, industry, and agriculture create isolated islands of wildlife habitat. Wildlife corridors prevent habitat fragmentation by connecting habitat areas along natural connections such as river ways or fields. Wildlife corridors also create important recreational opportunities for humans.

The Hockomock Swamp and other wetlands are home to several endangered species, and serves as critical habitat and vital water resource for wildlife. Vernal pools and "Riparian Corridors" along rivers and streams provide habitats for many rare species of plants and animals. Other rare endangered species which have not yet been identified may also inhabit the town.

OPEN SPACE & RECREATION

See Map 4-4, Open Space and Recreation Facilities.

Protected Open Space

Approximately 2,445 acres of land in West Bridgewater are held by town or state agencies for open space, recreation, wildlife habitat, water supply protection, or educational purposes. Another 941 acres enrolled under the state's Chapter 61, 61A, and 61B programs is discouraged from development, but not protected. Property owned or managed by the Executive Office of Environmental Affairs is the most well protected land, and is not at risk of a change in use. Land owned or managed by town agencies or municipalities is only moderately protected and can more easily undergo a change of use.

Table 4-2
Permanently and Partially Protected Open Space

Land	Area	Protection Level	Ownership
West Meadow State Forest	266.7	Protected	State
Hockomock Swamp	1,024.9	Protected	State
Other State Owned Land	200.5	Protected	State
Conservation Land	105.1	Protected	Town
Water Department	540.0	Protected	Town
Subtotal Permanently Protected	**2,137.2**	**22.8% of Total Town Area**	
School Department	76.4	Moderate	Town
Park & Forestry Department	26.4	Moderate	Town
61A Agricultural Land	814.7	Temporary	Private
61B Recreation Land	82.7	Temporary	Private
61 Forest Land	43.9	Temporary	Private
Other Privately Owned Land	2,085.8	Unprotected	
Subtotal Not Permanently Protected	**3,129.9**	**33.5% of Total Town Area**	
Total	**5,261.1**	**56.3% of Total Town Area**	

State-Owned Land

The Commonwealth owns two major areas in West Bridgewater, including the State Forest in the north (442 acres), the Hockomock Swamp in the southwest and south central sections (1,030 acres). Two additional sites in the eastern part of the town total 21 acres. These areas are used for hiking, cross-country skiing, wildlife habitat, wetlands, and flood water retention.

Town-Owned Land

The Town of West Bridgewater owns approximately 105 acres of conservation land, much of which is located in or near Hockomock Swamp and the State Forest. The Water Department manages 320 acres around the town's wells, including the Matfield Street Well area, the recently acquired Robery Farm area, and 200 plus acres surrounding the Cyr Street Well. The Cyr Street land is used for recreational purposes such as hiking and cross country skiing.

Unprotected Open Space

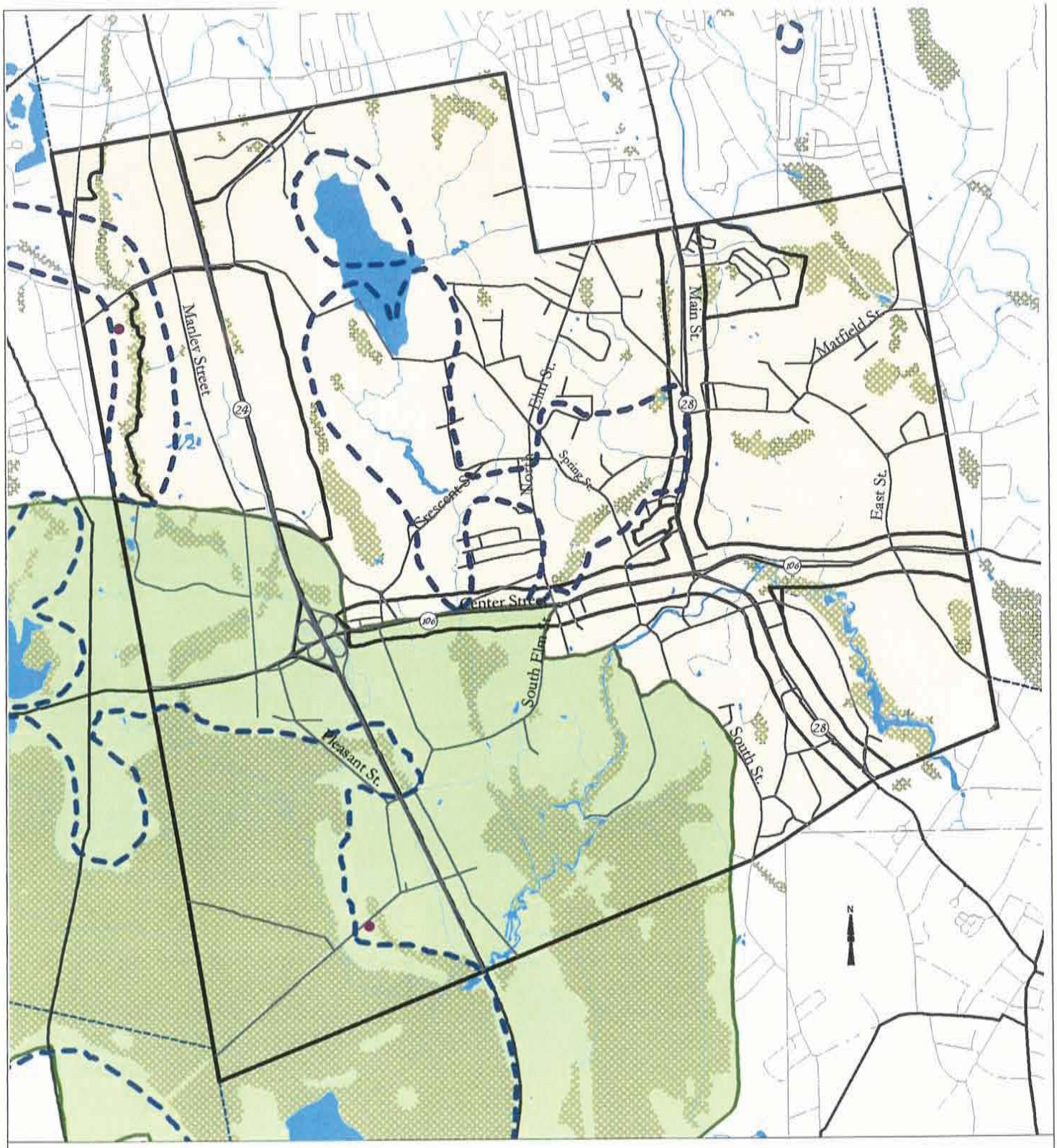
Approximately 34% of the total land in West Bridgewater is unprotected open space most of which is threatened by development.

Much of the unprotected open space is simply vacant, undeveloped land. Although wetlands and soil quality pose constraints in some areas, the development in unprotected areas could have a tremendous impact on the town.

See Map 4-5, Developable Open Space.

A community survey conducted for the 1999 Open Space and Recreation Plan noted that *agricultural lands form some of the most cherished scenic views, contributing significantly to the overall character of the town.* There are approximately 1,650 acres of land in active agricultural use, or about 17% of the

Land used for agriculture represents a significant portion of unprotected open space. A recent survey of the owners of agricultural land indicated that, with the exception of a few family farmers, the vast majority of these owners have NO long term commitment to farming.



Map 4-3

Habitats and Ecosystems (Regulated Areas)

2000 0 2000 4000 Feet

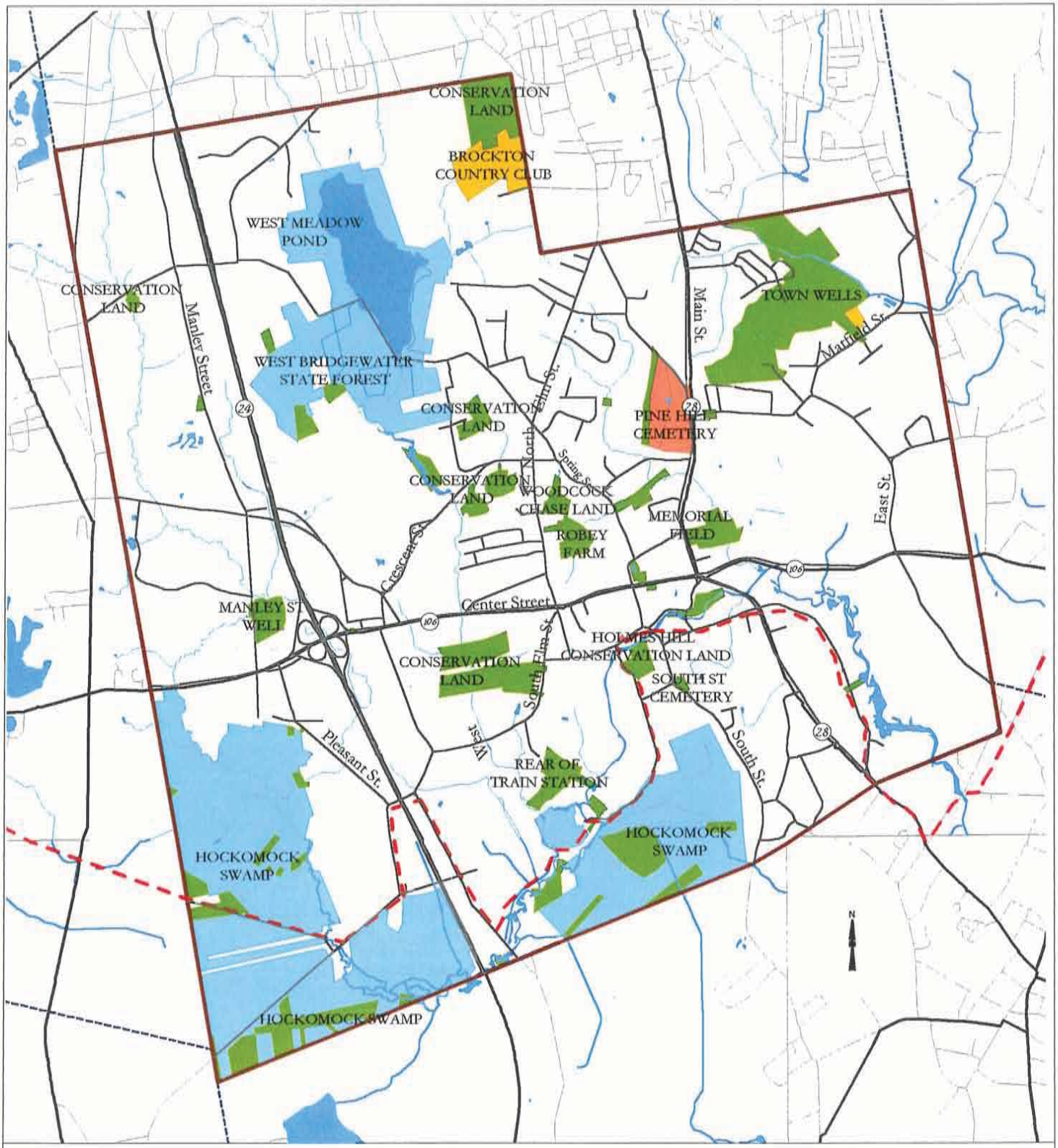
NHESP 1999-2001 Massachusetts Certified Vernal Pools

Areas of Critical Environmental Concern

NHESP 1999-2001 Estimated Habitats of Rare Wildlife: Use with Wetlands Protection Act
NHESP 1999-2001 Priority Habitats of State-Listed Rare Species: NOT equivalent to 'Significant Habitat' as designated under the Massachusetts Endangered Species Act

Town of West Bridgewater Master Plan

Prepared by Larry Koff & Associates



Map 4-4

Open Space & Recreation Facilities

2000 0 2000 4000 Feet

Town of West Bridgewater Master Plan

Prepared by Larry Koff & Associates

Protected Open Space

- Town of West Bridgewater
- Private, Nonprofit
- Private, For Profit
- Commonwealth of Massachusetts
- Bay circuit trail.shp

total town area. Traditionally the town's farms have produced dairy products, corn, vegetables, strawberries, blueberries, flowers, and apples. Recent decades have seen a loss of large-scale farming, especially dairy farming operations. While most of the agriculture land is owned by over 50 corporations and individuals who view agriculture as an interim activity, there still remains a core group of individuals who consider themselves farmers. See Appendix 4-1.

In FY2000, there were approximately 815 acres enrolled in Chapter 61A. This statute allows agricultural uses to be assessed at a fraction of their full value for as long as they remain in agricultural use. Should the property be developed or sold within that period, the landowner would owe the full amount of taxes that would have been paid up to that time. Also, if the property is to be sold, the town would have the first right of refusal to acquire the property at market value. Landowners participate in this program until they decide to withdraw, after which their property is taxed at the full value. Participation in this program by West Bridgewater farmers is rapidly declining; in 1999 there were approximately 1,243 acres of Chapter 61A land, declining from a total of 1,668 acres in 1988 (1999 Open Space and Recreation Plan).

Chapters 61 and 61B are similar programs to protect forestry and recreational uses. In FY2000 there were about 44 acres and 83 acres enrolled in these programs, respectively. Most of these areas could potentially be developable.

An additional 2,086 acres of open space and agricultural land are not protected under any program. Out of these, about 1,568 acres is classified by the assessor as developable or potentially developable land.

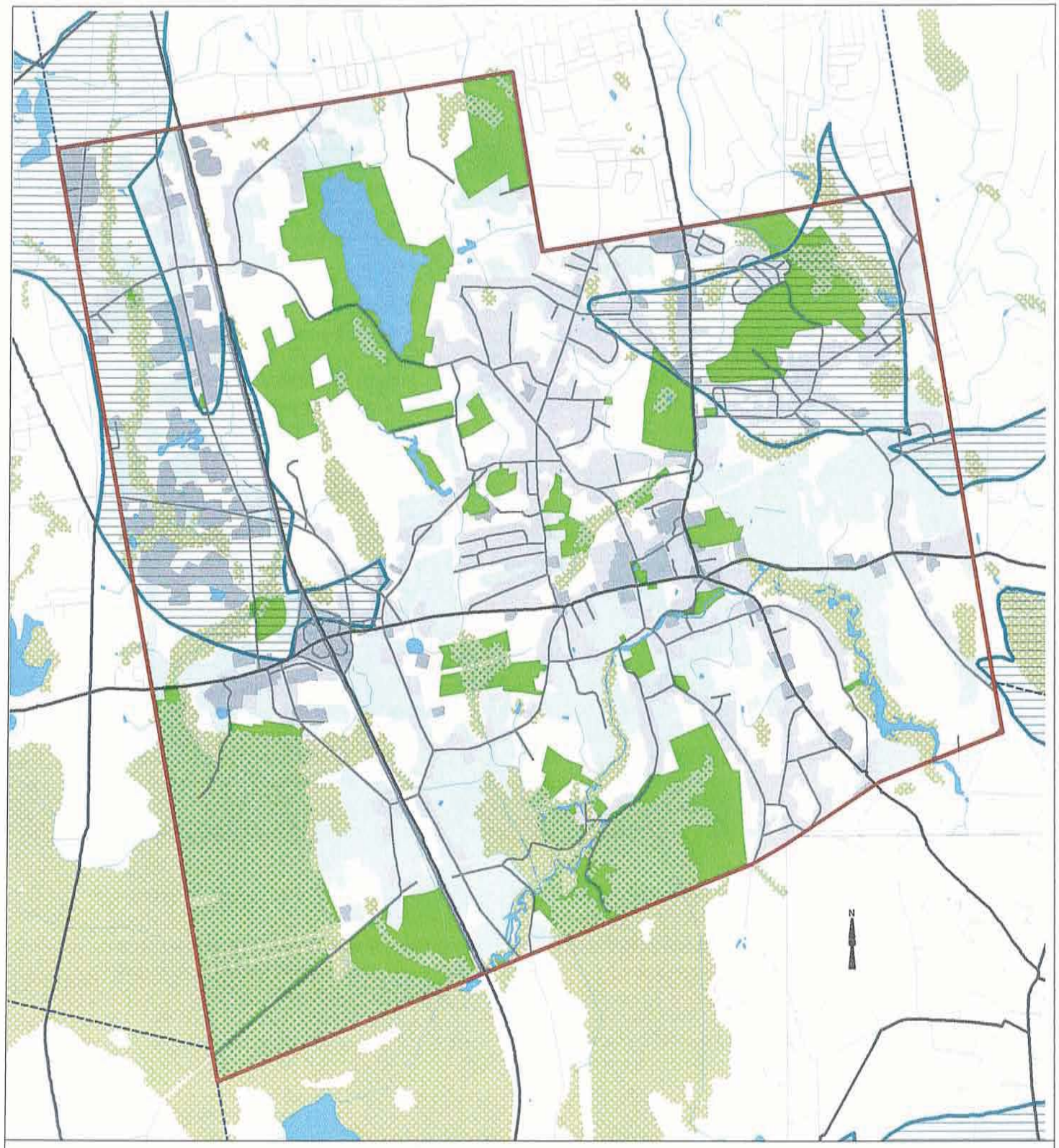
Recreation Facilities

The 1999 Open Space and Recreation Plan includes an inventory of publicly-owned lands in West Bridgewater that are of recreation interest. In addition to passive recreation opportunities on many of the protected open space parcels described above, the Town Forestry and Parks Department manages a total of 28.4 acres of land with active recreational facilities. These include the Town Hall area Ballfield and Gazebo, War Memorial Park, the Friendship Park playground, and the Lions Club Ice Skating Rink. In addition, the School Department manages 76.4 acres of land used for organized sports and playgrounds at the town's four school complexes. See Map 4-4, Open Space and Recreation Facilities.

The National Recreation and Park Association suggests that a town like West Bridgewater, with a population of about 6,600, should have somewhere between 40 and 70 acres of developed park land, divided into units of varying sizes and distances from residences, equipped with playgrounds, playing fields, trails, beaches, etc. The town currently has about 105 acres for this purpose.

Bay Circuit Trail

The Bay Curcuit Trail was conceived in 1929 by Charles Eliot, Jr., an apprentice to Frederick Law Olmsted. The concept was to have a series of parks and conservation land linked by continuous trails, waterways, and scenic drives from the North Shore to Duxbury Bay. These trails would provide access to the heritage and character of the New England countryside. Over 50 communities, including West Bridgewater, are intersected by the Bay Circuit Trail, which is over 100 miles long. *However, there is a 16-mile break in the Bay Circuit trail in the Bridgewaters due to a lack of continuous, designated, year round trails.* The completed trail in Easton needs to be connected to a trail through West Bridgwater and into East Bridgewater to begin to close the gap and complete this portion of the circuit.



Map 4-5

Developable Open Space

2000 0 2000 4000 Feet

Town of West Bridgewater Master Plan

Prepared by Larry Koff & Associates

Development Constraints

- Existing Development
- Intensive Development
- Protected Open Space
- Wetland
- Water

Potentially Developable Land

- Agriculture
- Vacant Land
- Groundwater Resource Area

but the rare species that reside in these habitats are protected by the Massachusetts Endangered Species Act.

- *Vernal Pools* are wetland areas that are intermittently submerged at certain times of the year. These sites can be certified through NHESP. Although only two vernal pool sites have been certified in West Bridgewater to date, a substantial number of potential sites have been identified (see Map 4-3). Certified vernal pools are protected under the Massachusetts Wetlands Protection Act.

Local Regulations

Watershed Resource Protection District

Three local zoning overlay districts are defined:

- Zone I, the area within 400 feet of an existing public well,
- Zone II, the area that contributes water to a public well
- Zone III, the recharge area for the public well.

The regulation prohibits the storage and disposal of hazardous wastes within Zones I and II, and limits such activities in Zone III. Most other uses are permitted by right or by special permit in Zones II and III, but are prohibited in Zone I. Special permits may be granted by the Planning Board or the Board of Health, depending on the use. Within Zone II, most commercial uses require a special permit from the Planning Board. In Zones II and III there is no restriction of residential uses or densities beyond what is permitted in the underlying district.

Flood Plain District

Section 4.5 of the Zoning Bylaw pertains to the Flood Plain District. This district is defined as all areas of special flood hazard identified as Zone A on FEMA maps. Within the flood plain, no uses are permitted which would result in an increase in flood level during the occurrence of a 100 year flood. Mobile homes and trailers are prohibited.

Conservation Commission Bylaw

West Bridgewater's Conservation Commission Bylaw/Rules and Regulations is intended to protect wetlands, water resources, and adjoining land from adverse impacts. No alteration is permitted within ponds, rivers and streams, 100 year flood plain, or within 50 feet of a wetland or bank (firm). Activity upon adjoining land within 100 feet of these areas, including removing, filling, dredging, building upon, or otherwise altering the land, requires approval by the Conservation Commission (flexibile). The definition and the requirements for protected buffer areas are not clearly stated within the bylaw. To date, these resources have not been adequately mapped. See Appendix 4-3 for a discussion of the role of buffers.

Buffer requirements are described as "firm", meaning that development is prohibited within the defined area, or "flexible", meaning that development is subject to review by some

Organization

Local Government

The Open Space Committee and various town boards and staff are charged with protecting resources.

- The Open Space Committee was responsible for working with consultants in developing the town's Open Space Plan. This committee is now working on identifying priority actions to implement.

- Recreation Activities are the responsibility of two volunteer organizations and the School Department.. Youth Athletics and Youth Football provide coaches, funding, and organizational support for Soccer, Little League, and Football. The Booster's Committee assists the School Department with fund raising and volunteers to assist with the school sport program.
- The following town staff are charged with enforcing the local regulations which are in place to protect the natural resources: Board of Health Agent, Building Inspector, Conservation Commission Agent, Water Department.
- The following additional Staff have a role in issues which impact the use and quality of the town's resources: Water Department, Highway Department, Forestry Department.

Private Institutions

The Natural Resources Trust of Bridgewater (NRTB) is dedicated to the preservation of natural resources in Bridgewater and neighboring communities. This organization promotes a regional approach to natural resources and open space planning through the participating communities focused upon the protection of water resources. A key function of the NRTB is grassroots education to inform the public of the value of protecting the local environment. As a land trust, NRTB is a private not-for-profit organization which can accept tax-deductible donations.

Bridgewater State College is another regional resource which provides technical expertise and volunteers to support environmental protection. Faculty have collected data on water quality in local rivers and streams, and other natural resources.

4.2 NEEDS/ISSUES ANALYSIS

The following issues were identified in the 1999 Town of West Bridgewater Open Space and Recreation Plan as well as in the analysis of the various elements of the master plan including economic development and public facilities. The major concerns relate to protection of critical resources including water, agricultural land, rivers and ponds, habitats and wetlands and the provision of protected open space and recreation areas.

Priority Issues:

1. Resource protection:
   - Water
   - Wetlands
   - Rivers, ponds
   - Habitats
   - Agricultural Land
2. Provision of :
   - Protected open space
   - Recreation facilities

Water Resources Protection

Surface water and groundwater resources are closely related, and both are threatened by the same potential sources of pollutants. Water flows between groundwater and surface water bodies, while wetlands provide a filter that helps to protect the purity of surface and ground waters. Additionally, flood storage in flood plains and wetlands is an irreplaceable natural flood control system and should be protected.

In addressing issues of future growth, protection of the Town's water supply is of utmost importance.

Contamination of local water supplies is an ongoing problem in communities such as West Bridgewater with poor soils, no public sewer system and on-going development which may contaminate or disrupt the flow of water that feeds resource areas. The Town has experienced problems from both "point sources", i.e, specific sites where polluting land uses have occurred and "non-point sources" such as stormwater run-off. As West Bridgewater is in the Taunton River Basin, any water contamination that happens in West Bridgewater not only affects the local water supply, but the supplies down stream as well.

Point Source Contamination

The Town of West Bridgewater, with the assistance of DEP, has or is in the process of addressing the known point sources of contamination. These include:

- Ten significant contaminated sites, four rated as "Default Tier 1B", one rated "Tier 1C", and five rated as "Tier 2"[3].
- The town landfill is located on south Elm Street. It has been capped and lined.
- The Brockton Sewage Treatment facility has been expanded and upgraded to prevent pollution downstream in Coweeset Brook.

Non-Point Source Contamination

The two greatest non-point source threats to groundwater and surface waters are septic treatment facilities and stormwater. Contamination from these sources might include solid particles, bacteria and viruses, metals, volatile organic compounds, and nutrients. These contaminants may leach through the soils or they may be deposited into surface water through runoff or discharge pipes. Such pollutants can affect drinking water quality and the ecological function of wetlands, ponds and streams.

[3] Tier classification is assigned based upon factors such as a site's complexity, type of contamination, and potential for human or environmental exposure. Some sites are automatically classified as Tier 1 sites if they pose an immediate hazard, affect public water supplies, or miss regulatory deadlines.

- Title V septic systems, even if operating properly, do not remove nitrogen or heavy metals from the sewage effluent that goes into the ground. Excess nitrogen can cause eutrophication and lower the amount of dissolved oxygen in rivers and ponds, having a detrimental effect on aquatic plants and animals. Malfunctioning septic systems have proved to be a source of surface water contamination in the past, as wastes enter the ground and aquifer without filtration.

The 1999 Open Space and Recreation study reported that 32% of recently tested septic systems failed to meet Title V requirements.

- Stormwater run-off which includes pesticides, fertilizers, herbicides, and other chemicals used by homeowners and farmers are another non-point source of contamination. The nutrients and heavy metal compounds from these chemicals are hazardous to aquatic plant and animal species and contribute to eutrophication of surface water. When these materials reach the ground water supply they can pose serious health risks to humans. Additionally, the use of road salts to melt snow and ice in winter can increase the salinity levels of surface and subsurface water bodies, which can adversely affect plants and animals in freshwater environments.

The town's Subdivision, Zoning, Conservation Commission, and Board of Health regulations need up-grading to adequately address these concerns. Best management practices (BMPs) and model bylaws should be considered.

Alternative Wastewater Treatment Strategies

The Town currently relies on DEP's Title 5 regulations to protect groundwater contamination. Due to the difficult soils and large percentage of older homes with antiquated systems, the Town will need to undertake additional studies to identify alternative strategies for addressing current and projected needs. Consideration should be given to the town adopting a Septic Management Program. The Town would establish an inspection program and up-grade systems which needed replacement. Homeowners would be charged a betterment fee with a 10-20 year payback.

One of West Bridgewater's challenges in the future will be to figure out how to provide a town-wide septic management program as well as to provide in limited areas needed wastewater infrastructure.

Stormwater Regulations

The Federal Government is requiring states and municipalities to update their stormwater regulations starting in FY 2003. In order to meet this deadline, the Town needs to establish a working committee of various departments concerned with storm water run-off. These departments include Highway, Water, Planning, Conservation, and Health. Issues have to be identified, surveys undertaken of existing conditions, and a plan developed which will correct illegal drains and connections. The Planning Board, Conservation Commission, and Board of Health, furthermore, need to adopt a similar Model By-law to ensure a consistent regulatory strategy.

Protection of Resource Areas

Resource areas include Wetlands, Vernal Pools, Habitats of Endangered Species, Ponds, Rivers, and the Hockomock Swamp. These resources are offered limited protections by the current regulations of the Planning Board and Conservation Commission. Substantial changes, as identified in Table 4-1 will need to be considered in order to protect these resource areas.

Rivers: Given the importance of these corridor areas for resource and habitat protection as well as recreation, the Conservation Commission should consider extending the buffer area to 300 feet

and having the first 100 feet firm, i.e., a no disturb zone. This would allow for the protection of important up-land areas. The Board of Health buffer for septic systems should be increased from 150 to 200 feet.

Ponds: There are no firm buffer requirements around ponds. Consideration should be given to establishing a 100 foot firm buffer and a 200 foot flexible buffer under Conservation Commission oversight.

Wetlands: the conservation commission currently has a 50' firm buffer. This should be extended to 100'. The Board of Health buffer should be increased from 150 to 200 feet.

Vernal Pools: these should be listed as protected areas under the Conservation Commission regulations.

Habitat Protection

The Town's major rivers and wetlands provide a framework for establishing a system of habitat corridors. These corridors were identified in the town's Open Space plan. Two north/south corridors could be created, paralleling Route 24 and connecting under Route 24 near the Bridegewater town line as it runs east and south along the Town River. These corridors would follow the Coweeset Brook to the west and Meadow Brook on the East.

By establishing wildlife corridors the town will both protect its water resources, prevent habitat fragmentation by connecting habitat areas along natural connections such as river ways or fields, and provide for important recreational opportunities.

Wildlife corridors are essential to preventing a decline in wildlife habitat due to fragmentation. Unfortunately many wildlife corridors are cut off by major roads and dense housing development, making it difficult for wildlife to thrive. Specifically, Routes 106 and 24 are barriers for movement between the West Bridgewater State Forest and the Hockomock Swamp. The development of unprotected land in many sensitive areas (shown on Map 7-5 in the 1999 Open Space Plan) will further fragment wildlife habitats.

West Bridgewater's native vegetation is threatened by invasive plant species such as purple loosestrife. Introduced as decorative landscaping, many of these species can be found for example in War Memorial Park. These invasive exotic plants provide a seed bank that threatens the native vegetation in West Bridgewater's wilderness area. If unchecked, invasive exotic species out-compete native vegetation, reduce wildlife habitat, and dominate the landscape. The invasive exotic species in West Bridgewater will require ongoing management since they are already well established.

- The Planning Board should consider establishing a Resource Protection Overlay district that includes the river corridors and the Hockomock Swamp. Within these areas, property owners would be required through a site plan review process to observe best management practices with respect to resource protection.

Protection of Agriculture and Open Land

Much of the forested and agricultural land is potentially developable, despite the presence of soil types that limit septic capacity. As shown on Map 4-1, areas with the greatest development potential are located in the northeast quadrant of the town, and along Manley Street. In the center of the town along Route 106, soil conditions would allow development with alternative septic treatment. Increasing land values and a growing market for development in the region will

enable development in these areas. With sewers or shared septic systems, all of the unprotected uplands in the town could potentially be developed.

Agricultural lands are particularly vulnerable to future development because farms are generally flat and cleared lands which make for easy development and lower development costs. Current strip zoning potentially hides views of farmland behind strips of commercial development along Route 106 and Route 28. Ultimately, the rural character of West Bridgewater will be irreversibly lost to development. This raises several issues of concern:

Protection of Agriculture
While the number of family farms is limited, steps could be undertaken to provide incentives to encourage the continuation of agricultural activities. Agricultural uses might be clustered in order to ensure that the impacts of agricultural activities on abutting residential neighbors is limited.

Protection of rural character and natural resources:
A survey conducted for the 1999 Open Space and Recreation Plan indicated strong support among residents for the acquisition of land to protect West Bridgewater's natural resources and rural character.

- Land can be purchased either in fee or limited to the development rights so that agricultural activities can continue.
- Cluster zoning of residential and commercial uses should be encouraged. The local by-law should be amended to protect views of farmland along major routes and encourage the preservation of open space while allowing for clustered development on rear lot parcels.

Fiscal Impacts
Open space, even more so than commercial uses is helping to keep down West Bridgewater's tax rates. For each $1.00 of revenue raised from privately owned undeveloped land, it costs the town $0.22 to provide services, compared with $1.14 to provide services to residences. Privately owned open space currently comprises about 43% of all privately owned land, and 5% of the town's assessed valuation, while commercial uses comprise about 19% of all privately owned land, and 32% of the town's assessed valuation. (See Appendix 4-4, Open Space Fiscal Impacts Analysis.)

Recreation
The 1999 Open Space Plan identified the need for additional conservation and recreation areas to connect existing open spaces together in a network of trails and accessible areas. Many of these connecting points could occur along river corridors and double as wildlife corridors.

While the prior plan focused on what is required to meet the existing population, there will be a great need to provide facilities for the town's future population. Projections estimate that the population could grow by 50% by 2020 (see Housing Section for details), and could double at full buildout. A balanced plan needs to be developed so that different parts of the town are each well served by recreational facilities.

Open Space Planning
Open space protection will provide economic, environmental, and recreational benefits to the town, as well as helping to preserve the town's rural character. Land can be protected through regulatory means such as cluster development or wetlands protection bylaws, private donation or purchase by a land trust organization, or acquisition by the town. None of these methods alone can succeed in achieving all of the town's open space protection goals. A combined strategy can

effectively target limited funding to the sites of greatest open space value, while taking advantage of opportunities to protect as much land as feasible.

Zoning regulations in West Bridgewater could go much further towards encouraging the protection of open space and natural resources than they currently do. There are a variety of zoning alternatives that can be used to promote open space preservation, including density controls, critical resource protection, and incentive zoning. Following are some options that might be appropriate for West Bridgewater. See Appendix 4-5 for graphic illustrations of some of these concepts:

- Large Lot Critical Resource District - increase minimum lot sizes to 3 acres in areas where warranted by sensitive environmental conditions.
- Transfer of Development Rights - designate "sending areas" and "receiving areas", and allow the sale of development rights from parcels in sensitive areas to increase the allowable density elsewhere.
- Conservation Subdivision - provide incentives for developers to set aside more open space or higher value open space through cluster subdivision design.
- Increase base lot size and require costly infrastructure so that cluster becomes more attractive than traditional subdivision design.
- Require submission of cluster site plan along with traditional site plan.
- Mandatory cluster in critical resource areas.
- Offer bonuses for proposals which provide greater benefit to the town.
- Allow cluster subdivision by right.
- Flexible Development - allow flexible lot sizes and shared driveways for small development projects on existing roadways in exchange for preserving views or natural landscapes.

Even with innovative zoning tools, the possibility of protecting targeted open space parcels through regulatory means is quite limited. The Town needs to develop a methodology by which individual parcels can be evaluated for their open space value. The table in Appendix 4-6 provides a preliminary scheme for prioritizing parcels developed for the 1999 Open Space and Recreation Plan. This listing needs to be honed to accurately reflect the town's goals and concerns. Potential parcels then need to be identified and can be contrasted using this weighting system. Priority parcels may be acquired by the Town or targeted for donation or purchase by a nonprofit land trust organization.

A listing of 13 parcels identified for acquisition and or protection in the Open Space Plan is included in Appendix 4-7.

Acquisition of open space may be more economical to taxpayers than allowing land to be developed, as demonstrated in the Cost/Benefit Analysis of Open Space Acquisition in Appendix 4-4. The tax increase due to the cost of providing services to new residents exceeds the fiscal cost of the Town purchasing the same parcel.

4.3 VISION / GOALS AND OBJECTIVES

VISION

Existing natural open river corridors following the wetlands, related uplands, and meandering paths of the Coweeset, West Meadow, Town and Salisbury rivers are linked with already protected open spaces including public water supplies, West Bridgewater State forest, the Hockomock Swamp,and conservation lands to form resource corridors and recreation opportunities which will protect water quality, public water supplies and natural resources, promote wildlife, preserve farmland, scenic views, and connect with regional trail systems.

GOALS AND OBJECTIVES

The following goals and objectives are based upon the 1999 Open Space and Recreation Plan.

1. To Link and connect major public open space holdings and resource areas

Objectives

a. Promote a ***West Bridgewater River Resource Open Space and Recreation Vision Plan (Map 4-6)***
b. Make the West Bridgewater connection to the Bay Circuit Trail.
c. Create safe connections specifically for pedestrian and bike traffic between organized recreation areas.
d. Maintain access to waterways for recreation.
e. Support the use of cluster zoning to permit both development and the linking of resource areas

2. To Protect West Bridgewater's water resources and natural environment

Objectives

a. **The Sensitive Natural Resource Diagram (Map 4-7)** identifies the river corridors, related wetlands,uplands, habitat, and public water supplies which should be recognized as the critical resource areas needing protection.
b. Use diagram to develop a resource protection plan for river corridors, wetlands, and habitats
c. Identify potential sources of contamination including stormwater, septic, point and non-point.
d. Have boards including Water Department, Planning, Conservation, Health, Building Inspector, Highway work together on this planning process
e. Seek outside funding to assist with study

3. To Conserve and/or acquire existing natural habitats, critical open spaces, and rural farmland

Objectives

a. Explore a variety of land conservation and acquisition strategies as a means to preserve the working farms and protect the natural resources of West Bridgewater.

b. Identify and target lands for conservation or acquisition which are critical for preserving rural character and for protecting natural resources.
c. Prioritize conservation of existing unprotected natural resources.
d. Prioritize conservation of farmland in Chapter 61A.
e. Establish a procedure for conserving and acquiring land.

4. To Improve open space and recreation facilities

Objectives
a. Identify needed recreation facilities
b. Prepare plan for locating new recreation facilities as buildout proceeds.
c. Provide adequate signs and parking in public lands to improve access and safety.

5. To have Open Space Committee become a town resource for conservation and recreation issues

Objectives
a. Create and maintain a clearinghouse of preservation/conservation information.
b. Educate citizens about open space and conservation issues.
c. Monitor need for ongoing management of open spaces.

4.4 RECOMMENDATIONS

The following three strategies provide a framework for addressing the towns' need to protect open space, natural resources, and provide for recreation.

1. PUBLIC AWARENESS AND POLITICAL ACTION

Vision/Open Space Concept

The West Bridgewater Riverway Resource and Recreation Protection Vision Plan (Map 4-6) establishes priorities first, for resource protection, second for acquisition of open space and recreation areas, and third, for retaining important agricultural resources. This vision plan needs to be reviewed and discussed more broadly by local residents.

Critical Resources which need protection

The ***Sensitive Natural Resource Area*** diagram Map 4-7. identifies areas corresponding to the resource protection priorities. A resource plan needs to be adopted.

First Priority:
Designation of critical resource river corridors. The corridors shown on the map 4-6 includes the Coweeset, Meadow, and Town Brooks and the Salisbury River. Associated wetlands, ponds, wildlife habitats, recreation corridors as well as the town Zone II water resource areas are included in these corridors.

Second priority:
Protect key open space and resource parcels and habitats many of which are located within or adjacent to these corridors. (See Appendix 4-7 for identification of priority open space parcels from Open Space Report.)

Third Priority:
Enhance protection within the resource corridors. A variety of regulations have been identified below to manage the protection of resource areas including wetlands, habitat areas, vernal pools, rivers, and ponds. A single protection district could be established to cover the areas shown on the map, or a system of different regulations could address specific concerns within this framework.

Open Space Committee

- Form a broader coalition in support of open space and resource protection, funding and recreation. This coalition will need to include citizens involved in school sports in order to advocate for the acquisition of additional recreation areas as well as citizen concerned with resource protection and agriculture. The immediate tasks of this broader coalition include:
  - Prioritizing Open Space, recreation, agriculture, and resource protection parcels
  - Establishing a local land trust (or a local chapter of an existing regional land trust) to pursue the donation of lands for open space protection
  - Organizing a Community Preservation Committee to make recommendations for local and State funding as well as the acquisition, creation and preservation of open space under the recently Community Preservation Act recently passed by the State.
- Continue to work with *The Natural Resources Trust of Bridgewater* for public education and coordinated open space planning. The Town should continue to work with the NRTB as well as the Trustees of Reservations, another land trust in the region to support its goals.
- Encourage West Bridgewater residents to form their own local chapter under the NRTB to pursue issues of special interest to their own community.

- Publicize West Bridgewater's open space, in terms of recreational opportunities and environmental and economic benefits. Tasks might include:
  - Publish a guide which maps and describes recreational opportunities available in West Bridgewater, directed to newcomers, visitors and townspeople.
  - Conduct seminars to inform farmers and landowners about land trusts, conservation programs and estate planning.

2. INVESTMENT IN OPEN SPACE

Acquisition of Priority Open Space Parcels

- Refine list of priority open space parcels identified in the 1999 Open Space and Recreation Plan by utilizing checklist for determining open space priorities.
- A complete inventory of the Town's protected/unprotected open space resources, agricultural parcels, and recreational facilities should also be prepared as a valuable tool for identifying open space protection opportunities.
- Pursue funding for the acquisition of land through the establishment of a local funding mechanism, as well as state and federal grants.

Open Space and Recreation Facilities

- Expand access to existing conservation lands for the enjoyment of hiking, boating, fishing, and other passive recreation activities.
- Recreational facilities for public land and waters, such as trails, picnic tables, fishing spots, and canoe passages should be developed.
- A trail system needs to be established throughout the town offering connections between the town's organized recreational areas like Friendship Park and the Town Hall sports fields, to more remote locales such as the Water Department land and the Hockomock Swamp.
- The Bay Circuit Trail connections through West Bridgewater should be developed and implemented.
- Implement the Community Preservation Act or create a local land bank that would provide ready funds for acquisition when priority parcels become available.
- Apply for a grant to bring recreational areas up to ADA standards.
- Increased funding and staff for the Parks Department may be necessary to manage open space and recreation areas, especially as improvements are made to areas outside of the town center.

3. PROTECTION OF RESOURCE AREAS

In addition to implementing the Open Space Concept Plan discussed above, steps should be taken to protect the town's valuable groundwater resources.

Rivers, Ponds, Wetlands:

- A single protection district could be established to cover the areas shown on the Sensitive Natural Resource Map or a system of different regulations could address specific concerns within this framework.

Water Quality

- Enact stricter oversight of storm runoff from development sites and agriculture. Appendix 4-8 provides a summary of some Best Management Practices, as well as nutrient loading standards that can be used to protect water quality.
- Flexible zoning and subdivision regulations can be targeted toward minimizing the impervious surface coverage and/or relating the extent of infrastructure requirements to development thresholds.
- Subdivision regulations can be changed to reduce required road widths on local service roads, and require drainage systems such as constructed wetlands which provide for stormwater treatment.

Habitat Resource Areas

- The Department of Environmental Management has identified boundaries of Rare Wildlife Habitat. These areas need to be protected by local zoning, sub-division, and conservation commission regulations rather than relying on State enforcement. Authority to manage the protection of Vernal Pools must be built into these regulations.

Potential Well Sites

- The Robery Farm site near the center of the town was acquired as a future source of public water. If tapping into this resource is to remain a possibility, great care must be taken to protect it. A Zone II overlay area needs to be delineated for this new well.
- Other potential well sites for future public water supply need to be identified and steps taken to protect their contributing recharge areas as soon as possible.

Wastewater

- A strategy must be developed based on Town Zoning, Health and Conservation bylaws, and infrastructure planning to protect critical resource areas from development resulting in adverse impacts for the community.

Coordination

- Increased communication and coordination between committees involved in open space planning and protection. Committees involved with open space include the Conservation Commission, Parks and Recreation Department, Tree Warden, Open Space Committee, the Bay Circuit Trail Alliance, the Planning Board, the Board of Health, and the Board of Selectmen.
- The Open Space and Recreation Committee should also be responsible for monitoring and coordinating the activities of other town departments and boards with respect to implementing the Open Space and Recreation Plan.

Regulatory changes

Zoning :

- Consideration should be given to establishing a Resource Protection overlay district to address development impacts within sensitive natural resource areas.
- The Hockomock Swamp area should be removed from the industrial district.
- Strip commercial zoning should be reduced to encourage the preservation of scenic views.
- The use of cluster subdivisions should be encouraged, and other zoning tools developed that will enable the concentration of development in areas with infrastructure and the preservation of open space.

Conservation Commission:

- Consider increasing the buffers to protect wetlands and river resource areas.

Farmland.

- Assist and encourage farm owners to preserve farms through agricultural easements.
- Priority consideration for preservation of agricultural land should be those locations where the lands are invaluable to the community and ecosystem.

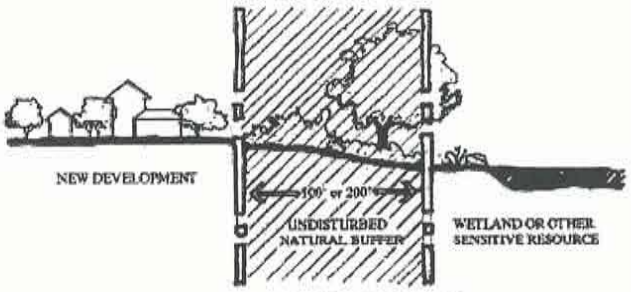
Appendix 4-3

Buffers

Specifically defining the critical natural resources for priority protection is a policy decision that will require further discussion. Various state and federal regulations restrict development within buffer areas around streams, ponds, and wetlands. The extent of buffer zones and the types of restrictions vary and are, in some cases, subject to interpretation. Improved mapping of regulated natural resources, especially wetlands and vernal pools, would help to clarify and extend protection status to all of the town's resource areas.

Buffers

There is no clear scientific guidance as to what constitutes a sufficient buffer to protect water resources. But without a stated purpose with the support of scientific evidence, local regulations have the likelihood of being overturned in court. Thus, to the extent possible, buffer requirements should address specific health and environmental concerns and they should be tailored to the type of land use and site conditions.



THE BUFFER CONCEPT

- The Massachusetts Resource Identification Project (MRIP) under the U.S. E.P.A. has identified "riparian corridors" encompassing land within 100 meters of all streams, rivers and ponds to protect ecological systems and provide corridors for wildlife migration. Like any arbitrary designation however, this may be insufficient or more than necessary for a specific site. Arbitrary buffer requirements frequently do not stand up when challenged in court.
- Many contaminants are not effectively filtered through soil, and will eventually seep into the groundwater below. The direction of groundwater flow, which can only be determined by site-specific analysis, will determine where the pollutants travel once reaching the water table. To protect water resources, a site specific analysis should be undertaken to determine the zone of contribution, rather than relying on arbitrary buffer zones. For some contaminants, such as nitrogen and phosphorous, maximum loading requirements would be more effective than buffers in protecting water resources.
- Viruses are one contaminant for which a scientifically-based buffer can be established. In the region's climate, viruses have been found to survive in soil for 120-200 days. In sandy soils such as Carver's, water typically travels at a rate of 1 foot/day, thus a sufficient buffer would be 200 feet from the water resource.

Strict enforcement of existing regulations by the town could represent a minimal standard for protecting water resources. Alternatively, the town could seek to protect a broader area through local regulation. Map 4-8 provides a composite sketch of the natural resource areas in West Bridgewater which need protection. These resources include ponds, streams, wetlands, riparian corridors, agricultural lands, wildlife habitats, and protected open space.

Appendix 4-4

Open Space Fiscal Analysis
Cost of Community Services Analysis

The following analysis compares the cost of providing services to each type of land user, compared to the revenues that category of land use generates. Residential land uses, which comprise about 29% of privately owned property in the town, cost the town $1.14 for every $1.00 revenue generated. Commercial land uses, comprising 14% of privately owned property, cost the town $0.42 for every $1.00 revenue generated, while open space and vacant land costs the town only $0.22 for every $1.00 revenue. Clearly, tax revenues from commercial, as well as open space land are helping to cover the cost of providing services to residents, and keep the tax rates as low as they are.

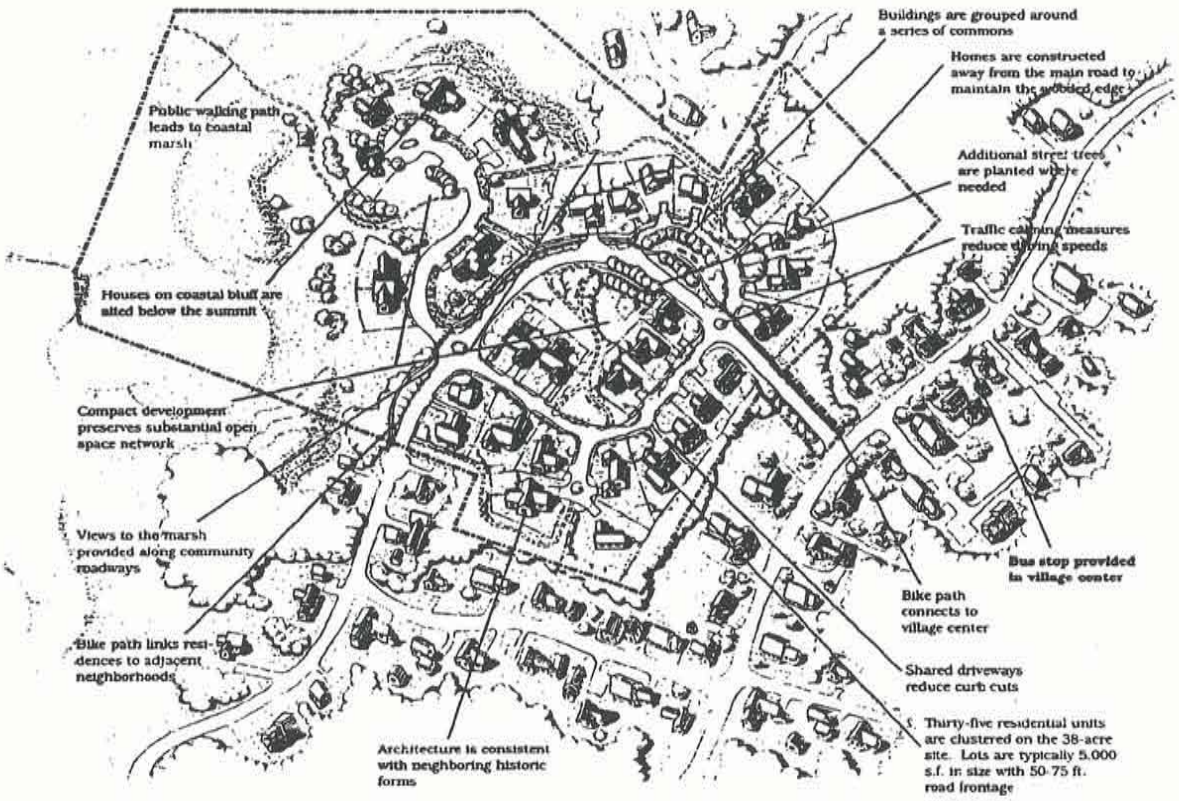
	Residential	Commercial	Open Space	Total	
				Based on FY2000 data	
Proportion of Total Real Property Assessment*	62.97%	31.95%	5.07%		
Proportion of Res./Com. Property Assessment	66.34%	33.66%			
Proportion of Com/Open Space Property Assessment		86.29%	13.71%		
Revenue					
Real Property Taxes	5,590,172.21	3,336,266.00	581,855.00	8,715,166.00	
Personal Property Taxes		622,444.88	98,856.12	721,301.00	
State Aid	2,684,835.00	54,991.00	15,068.00	2,754,894.00	
Local Receipts	1,482,595.74	752,275.55	119,475.71	2,354,347.00	
Other	621,678.40	315,442.34	50,098.26	987,219.00	
Total Revenue	**10,379,281.35**	**5,081,419.77**	**865,353.08**	15,725,485.00	
Expenditure					
General Government	546,465.71	277,279.09	44,037.21	867,782.00	6.14%
Safety	1,545,336.51	784,110.49	-	2,329,447.00	16.49%
School	7,012,716.00	-	-	7,012,716.00	49.64%
Public Works	370,809.67	188,150.45	29,881.88	588,842.00	4.17%
Human Services & Recreation	544,347.00	-	-	544,347.00	3.85%
Debt Service	659,349.93	334,557.03	53,134.04	1,047,041.00	7.41%
Benefits & Insurance	742,951.22	376,976.69	59,871.09	1,179,799.00	8.35%
Water	370,253.67	187,868.33	-	558,122.00	3.95%
Total Expenditure	**11,792,229.71**	**2,148,942.08**	**186,924.21**	14,128,096.00	
Expenditure/Revenue	**1.14**	**0.42**	**0.22**		

Real Property	value	acres	% value	% area	val Res+Com	val Com+Open
Residential	363747701	2,690.77	**62.97%**	**28.77%**	66.34%	
Commercial	184567172	1,313.08	**31.95%**	**14.04%**	33.66%	86.29%
Open Space	29312787	5,350.31	**5.07%**	**57.20%**		13.71%
Total	577627660	9,354.16				
Res+Com	548314873					
Com+Open	213879959					

Appendix 4-5

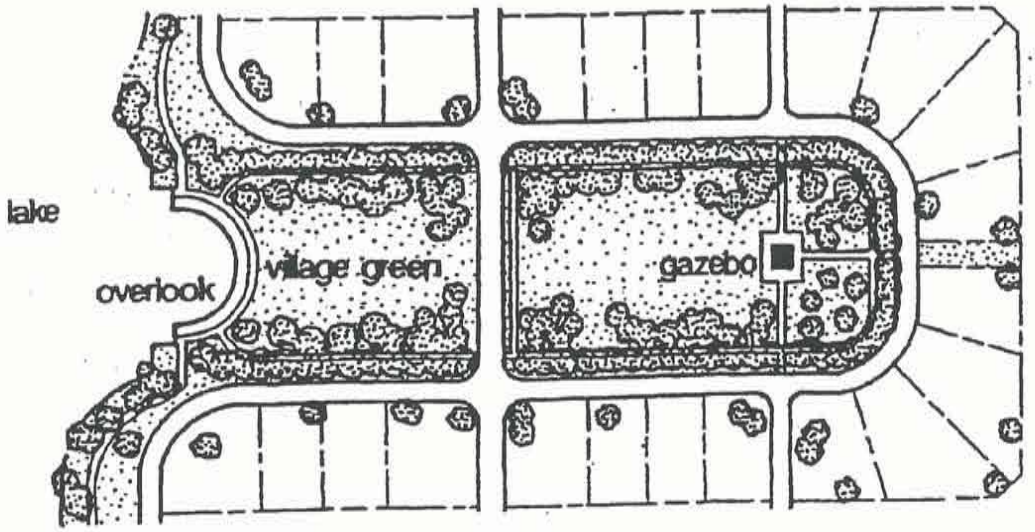
Zoning Illustrations

CLUSTERED DEVELOPMENT

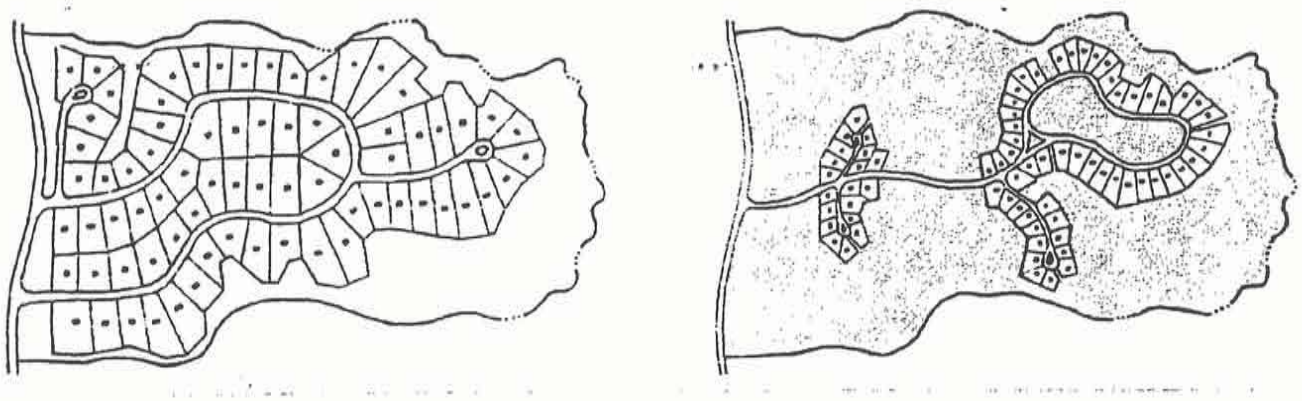


ENCOURAGES:

* natural resource and open space protection
* a variety of housing types
* reduced infrastructure costs



A formal central green provides a refreshing counterpoint in more rural developments.



Clustering makes the greatest sense when the difference in built form from conventional lotting is greatest.

Growth Strategy and Design
Clustered Residential Design Guidelines Workbook
Walter Cudnohufsky & Associates

Appendix 4-6

Land Protection Priorities

A Methodology for Rating Priority Parcels for Open Space Protection

Comparing Open Space Values	Priority Open Space Parcels						
Protect/Enhance Town Character							
Historically significant							
Enhance scenic vistas on streets or trails							
Protect familiar, valued open parcels							
Provide active/passive recreation							
Protect Natural/Agricultural Resources							
River, lake or stream frontage							
Well site recharge areas							
Unique ecosystem (rare/endangered species habitat)							
Other habitats: vernal pools, pine barons							
Agricultural protection							
Multiple use areas							
Connect New and Existing Open Space							
Links to existing and future open space							
Improve public access to existing open space							
Make regional trail connections							
Riparian corridor connections							
Make local trail /sidewalk connections							
Economic Impact							
High risk liability or contamination							
High build-out potential							

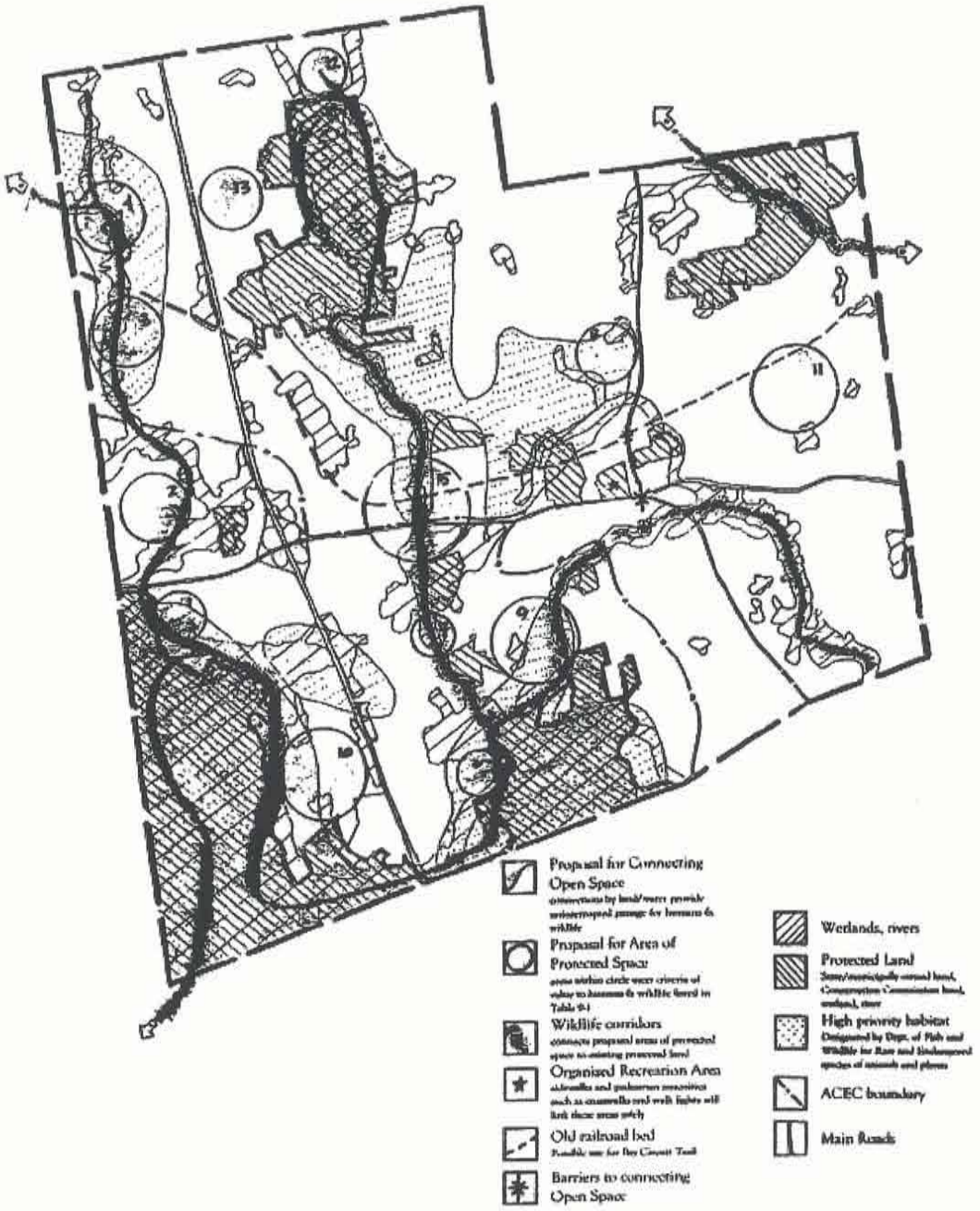
Appendix 4-7

Town of West Bridgewater 1999 Open Space Plan: Target Areas and Land Owner Identification (Estimated)

Target Areas

	Possible owner(s)	Parcel ID	Street address	LUC	Definition	Acres	Comments
1	EUA Service Corp.	49 009	750 W. Center	340	Office	83.17	
	Commonwealth of Mass.	49 011	West Center	901	State-owned	24.24	
2	Ronald Snell	42 008	24 Manley St.	410	Sand & gravel	24.78	
	Chadwick's of Boston Ltd.	35 024	15 United Drive	401	Warehouse storage	108.63	
	AMB Property LP	35 025	1 United Drive	401	Warehouse storage	29.87	
3	Bertarelli Brothers	21 012	Manley Street	047	Industrial/agricultural	11.49	
	Manuel Soares	21 022	Manley Street	132	Undevelopable residential	23.23	
	Manuel Soares	21 009	Manley Street	716	Agriculture	51.83	
	Wyner Association Inc.	21 010	208 Manley St.	046	Industrial/forest	56.06	
4	Edward & Dorothy Olecki	14 021	80 Walnut St.	101	Single family	6.06	
	John & Cynthia Turpin	14 020	72 Walnut St.	101	"	4.41	
	Frederick & Cari Davenport	14 059	171 Turnpike St.	101	"	4.47	
	Edward & Maryln DeMolles	07 031	Manley Street	713	Agriculture	36.14	
5	H&R Construction Corp.	44 047	352 W. Center	104	Two-family	7.60	
	Allied Properties & Mortgages	44 046	320 W. Center	323	Shopping center	29.50	
	Cynthia Asack	44 066	385 W. Center	390	Developable commercial	3.45	
	Donald & Christine Newman	44 022	135 Prospect St.	101	Single family	2.57	
	Cynthia Asack	44 074	West Center	390	Developable commercial	6.09	
6	V.S. Haseotes and Sons	66 003	Maple Street	131	Potentially develop. residential	7.85	
	V.S. Haseotes and Sons	66 004	Maple Street	131	"	7.77	
7	Robert & Janet Fowler	58 029	271 South Elm	104	Two-family	2.00	
	Joseph & Cheryl Kennedy	58 026	260 South Elm	101	Single family	0.55	
	Lynda Cavallaro Trustee	51 019	South Elm St.	719	Agriculture	24.35	
8	Gladys Johnson`	32 014	222 North Main	013	Residential/commercial	10.45	
	Pine Hill Cemetery Assn.	25 043	North Main St.	903	Town-owned	36.50	
	Bertarelli Brothers	25 041	Rear Harvestwood Dr.	717	Agriculture	42.10	
9	Howard & Carolyn Anderson	59 008	South Elm St.	713	Agriculture	31.50	
	Harold & Edith Anderson	59 013	South Elm St.	601	Forest	5.39	
	Town of West Bridgewater	59 009	South Elm St.	903	Town-owned	8.44	
	Harold & Edith Anderson	59 014	South Elm St.	601	Forest	11.24	
10	Kyriebrook Farm Ltd.	64 013	320 Pleasant Street	0713	Agric./residential/commercial	30.04	
	Clarence & Moniria Whynot	64 015	354 Pleasant St.	101	Single family	7.01	
	Alfred & Kathleen Rohnstrom	64 016	278 Pleasant St.	101	Single family	3.45	
	Byron & Joyce Haseotes	65 009	359 Pleasant St.	316	Storage/warehouse/distribution	4.99	
	V.S. Haseotes and Sons	70 003	Maple Street	442	Undevelopable industrial land	4.23	
	State of Massachusetts	70 002	Maple Street	901	State-owned	7.92	
11	Harold & David Sigren	33 019	East St.	717	Agricultural	14.59	
	William & Paul Bertarelli	33 020	East St.	713	Agricultural	20.74	
	William & Paul Bertarelli	33 021	East St.	712	Agricultural	19.84	
12	Louise Kaminsky	04 015	Walnut Street	718	Agriculture	71.15	
	Edward & Rachael Crowley	01 006	Walnut Street	131	Potentially develop. residential	26.80	
13	J.L.K. Properties Realty Trust	08 018	Walnut Street	131	Potentially develop. residential	21.83	

Open Space Concept



From 1999 Open Space and Recreation Plan

Appendix 4-8
Best Management Practices and Nutrient Loading Standards

BEST MANAGEMENT PRACTICES FOR NITROGEN REDUCTION

(from Nitrogen Concentrations in Well Water: A Handbook for Protecting Community Resources, Pioneer Valley Planning Commission, June, 1996)

BMP # 1: Drainage

Introduction:
Construction activities should minimize disruption of natural drainage systems. This can be accomplished by requiring a site design and grading plan, created by a landscape architect or environmental engineer, for new development projects or projects with substantial improvements. Site and grading plan requirements should minimize the amount of earth moving and vegetation removal and avoid disruption of streams, including seasonal or intermittent streams. In addition to interruptions to drainage systems, construction often results in sedimentation that can block drainage channels. Post-construction increases in runoff from newly constructed paved surfaces can increase the volume and velocity of stormwater into natural drainage systems as well as introduce contaminants into the runoff water. Please refer to the Stormwater Management BMP # 2.

Site DesignlGrading:
Layout of buildings and roads should work with topography and respect natural features. This approach minimizes the amount of earth moving and removal of native vegetation and therefore minimizes increases in stormwater runoff and sedimentation. Site design and grading is a complex subject and site specific.

Sedimentation Control:
Many techniques are available for preventing sediment accumulation in natural drainage systems during and after construction. An effective means of controlling erosion during construction is to follow a specific construction schedule, which carefully coordinates the timing of land disturbing activities with the installation of sedimentation control measures such as temporary seeding, mulching, temporary diversions, water bars, temporary slope drains, protective fabric, temporary sediment traps, sediment fences, and temporary stream crossings. In general, procedures which minimize land clearing, provide for timely installation of erosion and sediment controls and restore protective cover quickly reduces erosion and, therefore, sedimentation of natural drainage systems. Construction should be timed to avoid heavy seasonal rainfalls and provide a favorable climate for plant material to grow and restore protective cover. The Planning Board can work with developers to outline an acceptable Construction Sequence schedule and BMPs to minimize sedimentation. A complete listing of Construction BMPs can be found in the Massachusetts Department of Environmental Management's Nonpoint Source Pollution Management Manual known as the "MEGAMANUAL."

BMP # 2: Stormwater Management

Introduction:
Runoff from roads and parking lots is a by-product of development. Historically, stormwater management focused on flood control with systems designed to move large quantifies of water to the nearest stream, brook, lake or other water body. This management approach does not protect water quality because accumulated pollutants are deposited directly into the water body. For new development, stormwater must be disposed of on-site by requiring that post construction runoff from the site not exceed pre-construction conditions and amounts. Current stormwater management options include numerous techniques and devices to remove contaminants, sediments, organic nutrients, bacteria and heavy metals as well as manage flood control. Management approaches considered to be the most effective are listed below. Additional techniques can be found in DEP's MEGAMANUAL, the Massachusetts Nonpoint Source Management Manual. A copy of this manual should be available at the local town hall or directly from DEP by calling 508-792-7470. A stormwater management approach should be developed in conjunction with an overall drainage plan. Please refer to the Drainage BMP # 1.

Retention Ponds:
A retention pond is a man-made pond with the specific purpose of retaining storm water runoff. Retention ponds are extremely effective at removing pollutants. Well-designed ponds can be an attractive feature in a planned development. Retention ponds collect storm water runoff and allow the particulate pollutants to settle out in the pond rather than being transported to the surface water. Aquatic vegetation in retention ponds removes soluble nutrients. Sediment must then be removed and should be properly disposed of. Retention ponds need consistent maintenance including sediment removal, erosion control and weed removal to operate effectively.

Vegetated Swales:
A vegetated swale is a grassed area whose purpose is to slow down or retain runoff. This induces infiltration and decreases velocity of runoff. Vegetated swales can be used in place of curb and gutter drainage systems along highway medians. Swales reduce runoff velocity, act as additional infiltration devices, direct flow of runoff, and remove particulate pollutants during small storms. Vegetated swales can be attractive stormwater runoff containment measures in residential developments.

Water Quality Inlets:
A water quality inlet is a structure whose purpose is to separate oil and sediments from street and parking lot runoff. The structure is a large chambered container (usually 400 cubic feet of storage per contributing acre and 4 feet deep). Stormwater flows into the basin through storm drain inlets. The runoff then flows through two chambers, the first designed to catch and retain sediment and the second to filter and trap oil. Water quality inlets are effective in areas that receive a great deal of vehicular traffic like parking lots or gas stations. Water quality inlets have a limited capacity and require maintenance to remove trapped pollutants (which then must be disposed of properly). Additionally, because water moves quickly through the inlets, only coarse sediment, debris and oil is collected.

BMP# 3: Septic Systems

Introduction:
Many homes and small businesses in Massachusetts have substandard septic systems and illegal cesspools to dispose of sewage. It is very important that these substandard systems be replaced in water supply recharge areas (Zones I and 11) to protect public health from exposure to pathogens present in wastewater. Existing systems require regular maintenance to prevent failure and the release of pathogens to surface and groundwater. New systems must be constructed according to Massachusetts Title 5, the State Environmental Code for Subsurface Disposal for Sanitary Waste (310 CMR 15.00) and pursuant to local Board of Health regulations, which can be more restrictive if warranted,

Upgrading:
Septic systems in Zones I and 11 should be pumped and inspected every I to 3 years, and upgraded when inspection indicates problems. Alternative wastewater systems which treat effluent to higher quality levels than standard Title V systems should be considered for remediation purposes where small lot sizes and high densities present concerns about excessive nutrient loading, where there are shallow depths to water table or where soil conditions cannot be met according to the Title V regulations.

Maintenance:
Periodic pumping of septic tanks to remove accumulated solids should be required to prevent failure of septic systems and discharge of solids to the leach field.

Use:
Septic system additives should not be used. These additives often contain chemicals which will destroy the leach field clogging mat. They have not proved to benefit, in any way, the functioning of septic systems. These additives are now illegal to use in Massachusetts. Hazardous material such as paint thinner, bug sprays, furniture and metal polishes, antifreeze and other petroleum products should never be disposed of down drains and sinks. The Best Management Practice is to dispose of material at household hazardous waste collection days.

BMP# 5: Fertilizer and Pesticide Application

Introduction:
Nutrient management involves careful planning of soil fertility so that crop needs are met but leaching of fertilizer to surface water bodies and groundwater is minimized. This requires applying fertilizer in the proper amount and place at the right time to maximize uptake by plants. Integrated Pest Management (IPM) is a pest management approach which, in addition to chemical pesticides, utilizes a number of methods to control crop pests. IPM practices can reduce pesticide use up to 40%. This results in significant cost savings to the user as well as reduces the risk of contaminating ground and surface water.

Species Selection:
Plants and shrubs selected for home and commercial landscaping should be native species that are known to be lawn maintenance and pest-free, thus minimizing the need for on-site application of pesticides and fertilizers. Use of drought-resistant plants will reduce the need for supplemental watering, reducing the likelihood that any contaminants on the leaves will become non-point pollutants in runoff water from irrigation.

Fertilizer Application:
A soil test to determine nutrient levels is recommended. An accurate soil test is crucial to determine application rates of different types of fertilizer for maximum plant utilization. The Massachusetts Cooperative Extension (Located at University of Massachusetts, Amherst (413-545-4800) or the Soil Conservation Service (Northampton Office: 413-586-5440) can assist with information on soil testing and recommended application rates. Using proper rates, placement and timing of fertilizer can reduce nitrogen and phosphorus losses from leaching or wind transport by 50% - 90% . Irrigation practices should be managed to avoid over-watering, as excess water can cause soil erosion and leaching of nutrients beyond the root zone. Slow release granular fertilizers leach more slowly into the groundwater than liquid fertilizers, allowing more of the nitrogen to be absorbed by plants, and less to migrate into the groundwater resource.

Pesticide Application:
Minimizing or eliminating use of pesticides is the Best Management Practice for water resource protection areas. Integrated Pest Management (IPM) involves identifying the specific pest, monitoring the pest population, determining which pest(s) will cause economic, medical or physical damage, selecting control measures with the least ecological impact and applying them at the right time and place based on the pest's life cycle. When applying pesticides, label directions should be closely followed. Increasing the concentration or application does not do a better job of killing pests but simply increases the costs of pest control and as well as the chance of pesticides reaching surface and ground water. Pesticides should be mixed in an area away from wells and surface water bodies. Pesticides should only be applied under favorable climate conditions in terms of wind, rain and temperature to avoid leaching or air-borne transport of pesticides. Calibrate pesticide equipment regularly to insure proper application rates and to prevent leftover tank mixes. Prepare used pesticides containers for disposal by pressure rinsing and returning rinse water to the spray tank for application.

Organic farming is based upon a management system that seeks to emulate natural ecosystems by building soil humus through crop rotations, recycling organic wastes and applying balanced mineral amendments. Organic farming is done without the use of synthetic, chemical fertilizers, pesticides and herbicides; therefore the use of organic farming practice is considered a Best Management Practice. The elimination or reduction of the use of fertilizers, pesticides and herbicides in organic farming is recommended to protect water quality.

BMP# 6: Improving Lawn Care

Introduction: What you do in your yard can affect water resources ?
A clean, well maintained yard looks good. Those who pass by may comment on how beautiful your yard looks, how the neighborhood seems like a great place to live, how property values are actually enhanced by appearance.

What you do with our yard, however, can end up outside your yard - in your neighbors' yards, in the storm drain and eventually in the lake. If you multiply what you do in your yard by the number of people on your block or in your neighborhood, the impact from yards starts to look significant.

Ground covers and other plants hold your soil in place. The soil doesn't wash away , flowing into your neighbor's yard, clogging storm drains, and carrying along pesticides and nutrients that pollute the water.

The benefits of better yard care.
You can save time, money, and the environment by following the tips in this flyer. Time can be saved by adopting certain practices and by installing landscaping that requires less maintenance. Money can be saved by reducing the need for fertilizer and pesticides. Finally, the environment can be saved by reducing sources of runoff pollution.

Tips *for better yard care.*

- **Don't bag your lawn clippings**
  Bagging your grass clippings is a time-consuming and wasteful practice. Extensive research on lawn care has shown that grass clippings actually help you to maintain a vigorous, more durable lawn. It is not true that grass clippings cause excessive thatch build up.

- **Pay attention to lawn maintenance**
  - Don't let your lawn become a hay field (unless you want a hayfield) before mowing. The clippings should be no more than one inch long in order to fall through the grass and into the soil.
  - Use a sharp mower blade, (a mulching mower if you have one). The sharper the blade, the finer the clippings, the faster they decompose.
  - Avoid over-fertilizing your lawn. If it becomes too dense with growth, your clippings won't be able to reach the soil to decompose.
  - Remove excessive thatch before leaving your clippings on the lawn. Although 1/2 inch of thatch is ideal, a thick layer will keep clippings from reaching the soil.
  - Always mow your lawn when it's dry. If the grass is wet, the clippings will clump under the mower and won't be able to filter down to the soil.

- **Start a Backyard Compost Pile**
  Backyard composting of leaves and brush is advantageous to you, your community and our environment. A few of the benefits of composting are:
  - keeps valuable natural resources from being treated as waste and filling up landfills;
  - improves soil quality by increasing water retention, drainage and aeration; conserves water.

- **Other Tips**
  - Attract birds to your yard- birds eat insects, flies, and mosquitoes- by installing bird feeders, bird baths, and bird houses. Plant trees, shrubs, and other plants that encourage birds to visit your yard.
  - Reduce high-maintenance areas of sod, and increase low-maintenance landscaped areas. Some plants that don't need fertilizer or pesticides are ferns, myrtle, pachysandra, lily-turf, forsythia, barberry.
  - Know your soil, its characteristics, and its needs. Clay soils are very different from sandy soils. Your decisions for landscaping and maintenance should be based in part on the type of soil in your yard. Have your soil tested so you know how much fertilizer to apply.
  - Think of the surfaces you use in and around your yard and the way water flows off or through them. Divert water from paved surfaces onto grass to let water soak into the soil. Install gravel trenches along driveways or patios to collect water and let it filter into the soil.

For Further Information Contact.,
USDA Natural Resource Conservation Service (413) 586-5440

The information in this fact sheet was reprinted by permission of the USDA Natural Resource Conservation Service and derived from a publication of the U.S. Government Printing Office: *1991-0-505-213.*

NUTRIENT LOADING STANDARDS

Many towns in Massachusetts have implemented performance requirements for nutrient loading in surface water bodies and aquifers. Following are examples of methodology and loading standards that have been applied in the towns of Sandwich, Falmouth, and Gloucester:

SANDWICH:

5130. ANALYSIS OF DEVELOPMENT IMPACT. The applicant under Section 5110 shall provide an analysis of development impact, which, at a minimum, includes the following:

a. The existing condition of water body or water supply, including physical characteristics and water chemistry;

b. The expected change in the condition of the water body or water supply as a result of the proposed development;

c. The comparison, on a per acre basis, of the total nutrient loading from the proposed development with:

1. The existing and potential loading from all other developments and acreage within the recharge area of the water supply or water body; and

2. The loading rate which would be expected to produce critical eutrophic levels in the water body.

d. In determining the impact of nutrient loading from a development, the following standards and definitions shall be used (unless the applicant demonstrates to the Appeals Board that, given the nature of the proposed project and/or receiving waters, other standards are appropriate):

1. Loading per person: .25 lbs. phosphorus per person per year for sewage disposal systems within three hundred (300) feet of the shoreline;

2. Loading from road runoff: .25 lbs. phosphorous per curb mile per day;

3. Critical eutrophic levels - fresh water concentration: total phosphorous = .02 mg/liter.

FALMOUTH
Special Permit Requirements in Recharge zones — Zoning bylaw, Adopted: 1984
Contact: Jon D. Witten, (508)362-5570

5340. Special Permit Requirements in Recharge Zones for Transient Residential Facilities. The Special Permit Granting Authority may withhold approval of a special permit for the construction of any new structure or structures or portion thereof intended for transient residential use, requiring a special permit as defined by the Zoning By-law, which are located on a lot or lots that lie within a zoned water recharge area (See Section 5341), if, after weighing all the pertinent facts and evidence the Special Permit Granting Authority finds that:

a) The existing condition of the receiving waters is at or above critical eutrophic levels (see definition: Section 5342 (d-4)1 or in the case of well recharge areas, nitrate nitrogen concentrations in the groundwater exceed five (5) parts per million; and
b) The nutrient contribution from the proposed development, when added to the existing and potential nutrient level of developments within the specific recharge area, will generate on a pounds per acre basis, nutrient levels that exceed the receiving waters critical eutrophic level or, in the case of well recharge areas, nitrate-nitrogen concentrations in the groundwater in excess of five (5) parts per million. However, the Special Permit Granting Authority shall not withhold approval of an application for a special permit if the applicant provides measures for the reduction of the nutrient loading rate, on a pounds per acre basis, to a rate below that which would produce critical eutrophic levels in the water body or, if in a well recharge area, nitrate-nitrogen concentrations less than five (5) parts per million. It shall be the responsibility of the applicant to demonstrate to the Special Permit Granting Authority that the proposed mitigating measures will work as designed and the Special permit Granting Authority may require the applicant to demonstrate on an annual basis that said mitigating measures are operating satisfactorily.

5341. Recharge Areas. Recharge areas for freshwater ponds, coastal ponds and existing or proposed public (municipal) water supply well as shown on the Zoning Map, shall be considered superimposed over a other districts established in this By-law.

5342. Analysis of Development Impact. The applicant, under Section 5340, shall provide an analysis of development impact which at a minimum includes the following:

a) The existing condition of the water body or water supply, including physical characteristics and water chemistry;
b) The expected change in the condition of the water body or water supply as a result of the proposed development;
c) The comparison, on a per acre basis, of the total nutrient loading from the proposed development with:
    1) The existing and potential loading from all other developments and acreage within the recharge area of the water supply or water body; and
    2) The loading rate which would be expected to produce critical eutrophic levels in a water body or in the case of water supply, the loading rate which would produce nitrate-nitrogen levels in excess of five (5) parts per million in the groundwater.
d) In determining the impact of nutrient loading from a development, the following standards and definitions shall be used:*
    1) Loading per person: 5 lbs. Nitrogen per person per year; .25 lbs. Phosphorous per person per year for sewage disposal systems within 300 feet of the shoreline;
    2) Loading from lawn fertilizers: 3 lbs. Nitrogen per 1,000 square feet per year;
    3) Loading from road run-off. .19 lbs. Nitrogen per curb mile per day; .15 lbs. Phosphorous per curb mile per day;
    4) Critical eutrophic levels: Fresh water concentration, total Phosphorous -- .02 mg./litre; salt water concentration, total Nitrogen - .75 mg./litre

*Unless the applicant demonstrates to the Special Permit Granting Authority that given the nature of the proposed project and/or receiving waters other standards are appropriate.

5343. Exemptions. The Special Permit Granting Authority may exempt an application from the requirements of Section 5340 provided that the applicant can demonstrate that:

a) Nutrients from the development will not in fact be recharged to the designated water body or public water supply well; or
b) that the development will not result in any increase in loading of the relevant nutrient.

5344. Relation To Other Requirements Of The Zoning By-law. Approval of a Special permit as noted in Section 5340 shall not substitute for compliance with any other requirements of the Zoning Act or Falmouth Zoning By-law.

GLOUCESTER

RULES AND REGULATIONS GOVERNING THE SUBDIVISION OF LAND: Appendix A, Environmental Impact Evaluation

...

Nitrogen and/or Phosphorus Loading Report:

For review of water quality impact, an applicant shall submit calculations of anticipated nitrogen and/or phosphorus contributions from roads, lawns, and septic systems. Applicant must determine the "carrying load" or ability to absorb nitrogen and phosphorus loading of all receiving water system on site.

Appendix B Methodology and Standards for Determination of Nutrient Loading

Methodology

1. Determination of nutrient loading shall be done using available loading estimates from county, state or federal performance standards and shall include, at a minimum:
   (a) The existing condition of the water body or water supply, including physical characteristics and water chemistry;
   (b) The expected change in the condition of the water body or water supply as a result of the proposed development;
2. When comparing the nutrient loading of the proposed subdivision to the carrying capacity of receiving waters, the probable effect of the subdivision on the receiving waters (ground or surface) over a period of time shall be set forth, assuming total buildout of the subdivision.
3. All comparisons of the nutrient loading from the proposed development with loading from other developments shall be done on a per acre basis.

Standards

In determining total nutrient loading of a development and critical eutrophic levels, the following standards shall be used:*

a). Loading per person: 5 lbs Nitrogen per person per year; .25 lbs Phosphorus per person per year for sewage disposal systems within 300 feet of the shoreline. Persons per dwelling unit = 5.0.

b). Loading from lawn fertilizers: 3 lb Nitrogen per 1000 square feet per year.

c). Loading from road run-off: .19 lbs Nitrogen per curb mile per day; .15 lbs Phosphorus per curb mile per day.

d). Critical eutrophic levels: Fresh water concentration, total Phosphorus = .02 mg/litre; salt water concentration, total Nitrogen - .75 mg/litre.

e). Critical level for ground water used for drinking water = 5 parts per million nitrate Nitrogen in well recharge areas.

*Unless the applicant demonstrates to the Planning Board that given the nature of the proposed project and/or receiving waters, other standards are appropriate.