DESIGNATION of the

SQUANNASSIT AREA OF CRITICAL ENVIRONMENTAL CONCERN

located in portions of the Municipalities of

ASHBY, AYER, GROTON, HARVARD, LANCASTER,
LUNENBURG, PEPPERELL, SHIRLEY and TOWNSEND

WITH SUPPORTING FINDINGS

Following an extensive formal review required by the regulations of the Executive Office of Environmental Affairs relative to Areas of Critical Environmental Concern (301 C.M.R. 12.00) including nomination, on-site visits, research, public information meetings, a public hearing and written comment period, and evaluation of all public comment and assembled data, I, the Secretary of Environmental Affairs, hereby designate the Squannassit resource area, located in portions of the municipalities of Ashby, Ayer, Groton, Harvard, Lancaster, Lunenburg, Pepperell, Shirley and Townsend, as an Area of Critical Environmental Concern (ACEC). I take this action pursuant to the authority granted me under Mass. Gen. L. ch. 21A, § 2(7).

I also hereby find that the wetland resource areas included in the Squannassit ACEC are significant to the protection of groundwater supply and private water supplies, the prevention of pollution, flood control, the prevention of storm damage, the protection of fisheries, and the protection of wildlife habitat - all of which are public interests defined in the Wetlands Protection Act and regulations promulgated thereunder.

I. Procedures Leading to ACEC Designation

On March 25, 2002 I received a letter of nomination submitted by 125 citizens from the 9 municipalities located within the nominated area pursuant to the ACEC Regulations at 301 C.M.R. 12.05. On the same date, I also received a letter of nomination for the Petapawag resource area, located adjacent to the nominated Squannassit resource area in the municipalities of Ayer, Groton, Dunstable, Pepperell, and Tyngsborough, submitted by 66 citizens pursuant to the ACEC Regulations at 301 C.M.R. 12.05. On April 11, 2002 I accepted the Squannassit and Petapawag nominations for separate and concurrent full reviews. Because the nominated areas are located adjacent to one another with clear ecological relationships, and portions of three communities (Ayer, Groton and Pepperell) are located in both nominated areas, public information meetings that covered both nominated areas were held in the course of the public reviews. Throughout the reviews public comments were submitted addressing either or both of the nominated areas. Toward the end of the public review process, separate public hearings were held for each nomination, and separate designation decisions are provided. See the designation document for the Petapawag Area of Critical Environmental Concern for further information regarding that nomination review and designation.

In my April 11, 2002 letters to the nominators, municipalities, state legislators and a mailing list of over 300 names, I outlined the ACEC nomination review process, and scheduled initial public information meetings to be held in May and June in each of the 11 communities included in the two nominated areas. Notice of these public information meetings was also included in the April 24, 2002 issue of *The Environmental Monitor*, published by the Massachusetts Executive Office of Environmental Affairs (EOEA), and in several local and area newspapers.

For the first time in the history of the ACEC Program, the nominators created an internet web site for the dissemination of information regarding the nomination and the public review process. Also for the first time, the nominators used Geographic Information System (GIS) computer mapping and databases to prepare the nomination and to provide resource overlay maps for both the nomination reports and the internet web site. The ACEC Program internet web site also provided information regarding the nomination public review process and details regarding the ACEC Program.

Eleven public information meetings were held in May and June as scheduled. Following these meetings, in correspondence to the nominators, towns and legislators dated August 8, 2002 I confirmed the scheduling of four additional public information meetings, to be held in August and September in the towns of Ayer, Tyngsboro, Pepperell and Dunstable. At this time I also scheduled the public hearings to be held for each nomination, for Squannassit on September 24 in Townsend and for Petapawag on October 1 in Groton. Over 400 copies of the letter and public notice were mailed to municipal boards of selectmen, planning boards and conservation commissions, and to state legislators, state and regional agencies, environmental organizations, citizens, and other interested parties.

As required by the ACEC Regulations at 301 C.M.R. 12.08, a copy of the public notice was published in the August 10 and August 24, 2002 issues of *The Environmental Monitor*, published by EOEA. Copies of the public notice also were published in the following newspapers - the *Sentinel and Enterprise*, on August 13 and 19; the *Groton Landmark*, the *Harvard Hillside*, the *Pepperell Free Press*, the *Ayer Public Spirit*, the *Shirley Oracle*, and the *Townsend Times* on August 16; the *Lowell Sun*, on August 19; the *Shirley Volunteer* and the *Worcester Telegram and Gazette*, on August 20; and the *Groton Herald*, on August 23, 2002. The August and September public information meetings were held as scheduled.

I conducted a public hearing regarding the Squannassit nomination on September 24, 2002, at the North Middlesex High School auditorium in Townsend. Oral and written testimony was received from approximately 50 people representing individual residents and a variety of groups and organizations. Approximately 135 people attended the hearing. A ten-day period for the submission of additional written comment followed the public hearing; however, public comments were accepted for an additional week (ending October 11, 2002) to coincide with the conclusion of the ten-day written public comment period that followed the October 1 Petapawag ACEC nomination public hearing.

On November 25, 2002 I issued a formal waiver, pursuant to the ACEC Regulations at 301 CMR 12.15, to waive the 60-day time period following a public hearing for making a final decision regarding ACEC designation (as set forth at 301 CMR 12.10). Due to the extensive scope and complexity of the environmental review, the final date for making this decision was changed from November 25, 2002 to December 16, 2002.

In the course of the overall review for both nominations, written and oral testimony was received from numerous individuals, private organizations and public agencies. Copies of comment letters are on file at the offices of the Department of Environmental Management (DEM), Division of Resource Conservation, ACEC Program in Boston. Approximately 250 oral and written comments, plus a petition with 42 signatures, were received for the two nominations in the course of the public participation and review process. For further details see below, Summary of Comments under section IV. Summary of the Criteria for Designation.

II. Summary Description of the Resources of the Squannassit ACEC

Resource Analysis and Mapping

In the course of administering the review of the nomination, DEM prepared a series of environmental resource overlay maps regarding the nominated area. This information was mapped using EOEA's Geographic Information System (MassGIS). The maps, which were used to assist in the evaluation of the nomination and the determination of final boundaries, are part of the public record of the Squannassit ACEC designation, and are on file at the offices of the ACEC Program at DEM's Division of Resource Conservation.

MassGIS data was used to map and evaluate several categories of information: surface waters and drainage basins; wetlands; public drinking water supplies and aquifers; floodplains; rare and endangered species habitat; land use; Chapter 61 (forestry), 61A (agriculture), and 61B (recreation) properties; and protected open space, conservation and recreation lands owned by federal, state, and municipal governments and nonprofit organizations.

Resource Overview

A brief summary of the resources of the ACEC is provided in this designation document. Additional useful information regarding these resources is provided in the Squannassit ACEC Nomination Report (March 2002) and other materials and correspondence assembled as part of the nomination review.

The size of the designated Squannassit ACEC is approximately 37,450 acres, with approximate amounts in each town as follows:

Ashby	2,930	acres
Ayer	690	
Groton	3,990	
Harvard	250	
Lancaster	10	
Lunenburg	4,010	
Pepperell	6,030	
Shirley	4,490	
Townsend	15,050	

For the most part, the Squannassit ACEC lies along and to the west of the Nashua River, from a section of Route 2 in the Towns of Harvard and Lancaster north to New Hampshire. The boundary of the Squannassit ACEC connects with the boundary of the Central Nashua River Valley ACEC to the south, along the Nashua River corridor. The Squannassit ACEC is also adjacent to the Petapawag ACEC, which is located along and to the east of the Nashua River, from the Town of Ayer north to New Hampshire. The Squannassit and Petapawag ACECs share the Nashua River corridor and its associated physical, biological and cultural resources and history. Although the two areas were nominated and designated as separate ACECs, it is important to state that the Nashua River corridor is a central resource feature of both of these ACECs (as well as a central feature of the Central Nashua River Valley ACEC.)

The name of the nominated area – Squannassit – is derived from combining parts of the names of the Squannacook, Nashua and Nissitissit rivers. The resources of the ACEC are located in portions of several sub-watersheds, all located within the larger Nashua River Basin. These sub-watersheds include those for

the Squannacook and Nissitissit rivers, and for the Mulpus, Catacunemaug, Walker-Morse, and Bancroft-Robinson-Wrangling brooks.

An overview of the geology, topography, hydrology and vegetation of the area is provided in the Squannassit nomination report. According to the report, the area lies at the transition between two major forest biomes, the northern hardwood-hemlock-white pine forests which extend into Canada, and the central hardwood-oak-hickory forests which extend to Georgia. Both biomes exist together in varying combinations throughout the Squannassit area, resulting in diverse mixtures of vegetative species. According to the nomination report, the five largest tributaries to the Nashua River in this area flow to the southeast, while the Nashua River flows to the north. The direction of flow of the tributaries is controlled by deep underlying bedrock valleys. The report states that the confluence of diversity of topography, soils, hydrology, and vegetation is unique and has, in turn, resulted in a corresponding diversity of habitat types and therefore of biodiversity. The area supports a remarkable richness of wildlife ranging from concentrations of rare and endangered species to deer, moose, fisher, bobcat, otter, and even occasional black bear. High- and medium-yield aquifers are located along many of the riverine corridors, and provide high quality ground water to public drinking water supplies. Rare species habitats are located throughout the ACEC, as well as extensive areas designated as Core Habitat and Supporting Natural Landscape by the Commonwealth's BioMap Project. Agriculture and forestry are important components of the overall resource complex. The area contains unique and highly significant archaeological and historical resources, as well as scenic landscapes of statewide significance.

According to maps and data prepared for the review of the nomination by DEM, approximately 80% of the ACEC is comprised of forest and farmland. (Approximately 27,570 acres or 74% of the ACEC is comprised of forestland and approximately 2,310 acres or 6% is farmland.) Nearly 50% of the ACEC is comprised of protected open space and land under Chapter 61, 61A and 61B tax classification status. (Protected open space covers approximately 14,660 acres or 39% of the ACEC, and Chapter 61, 61A and 61B lands cover another 3,280 acres or 9% of the ACEC.)

The ACEC includes all nine groups of the inland resource features listed in the ACEC Regulations, of which a minimum of four is required for nomination review. Those resource features are inland surface waters, inland wetlands, natural hazard areas, habitat resources, fishery habitat, agricultural areas, water supply areas, historic/archaeological resources, and special use areas.

Surface Waters

The ACEC includes portions of several sub-watersheds of the Nashua River Basin. According to the Squannassit nomination report, the large scale hydrology of the Squannassit area is characterized by a system of relatively long, well-defined rivers and perennial streams, and contains all or portions of 41 perennial streams. Table 1 in the nomination report and the Squannassit ACEC Summary Sheet provides a listing of these rivers and streams. The report states that the aquatic and riparian habitat and corridors associated with this extensive system of water courses create not only the primary ecological connections throughout the region, but also represent a major portion of habitat – approximately 5,800 acres or 15% of the nominated area lies within 200 feet of a river or perennial stream. The 2 rivers and 26 streams located within the Squannacook and Nissitissit sub-basins have been designated as Outstanding

Resource Waters (ORW) pursuant to the Massachusetts Rivers Sanctuary Act of 1975 and the Massachusetts Surface Water Quality Standards (310 CMR 4.00). The land area of these ORW sub-basins is approximately 26,310 acres or 70% of the ACEC.

Again according to the nomination report, there are approximately 10 ponds greater than 5 acres located within the nominated area. The largest ponds include Grove Pond (approximately 68 acres) and Plow Shop Pond (29 acres) in Ayer, Heald Pond (28 acres) in Pepperell, H&V Mill Pond (37 acres) in Groton and Shirley, Harbor Pond (39 acres) and Vinton Pond (16 acres) in Townsend.

According to the list of Great Ponds compiled by the Department of Environmental Protection (DEP) in 1996, the following ponds are classified as Great Ponds, subject to the provisions of the Waterways (Chapter 91) Regulations (310 CMR 9.00):

Heald Pond (or Blood Pond) in Pepperell, and
Squannacook Pond in Shirley.

Wetlands

According to GIS data, wetlands cover approximately 1,420 acres or 4% of the ACEC (this figure most likely underestimates the amount of wetlands within the ACEC – it will be updated in the Squannassit ACEC Summary Sheet when the more accurate MassGIS Orthophoto Wetlands and Streams (1:5,000) datalayers are available for the entire ACEC). According to the Squannassit Nomination Report, numerous wetland areas are located throughout the nominated area, but most of the larger wetlands are associated and connected by the rivers and largest streams, enhancing the habitat value of these riverine corridors. The two most extensive sets of interconnected wetlands lies along the Squannacook River and Mulpus Brook. As a finding of this ACEC designation, the wetland resource areas included in the Squannassit ACEC are significant to the protection of groundwater supply and private water supplies, the prevention of pollution, flood control, the prevention of storm damage, the protection of fisheries, and the protection of wildlife habitat - all of which are public interests defined in the Wetlands Protection Act and regulations promulgated thereunder.

Natural Hazard Areas

Natural hazard areas, as a resource category in the ACEC regulations, include floodplain areas. Floodplains designated by the Federal Emergency Management Agency (FEMA) are shown on the GIS maps prepared for the nomination report and also by DEM GIS staff for the ACEC nomination review. According to DEM GIS data, 100 and 500-year floodplains cover approximately 6,020 acres, or 16% of the ACEC. Floodplains are located along the rivers and perennial streams, especially along the Squannacook and Nissitissit rivers and their tributary streams, along Mulpus Brook, and along the Nashua River.

Habitat Resources

Wildlife resources and habitats of the Squannassit ACEC are diverse and extensive. General wildlife and rare species habitat include fisheries and wildlife habitat, rare species habitats described as Priority Habitats and Estimated Habitats for Rare Wildlife by the Commonwealth's Natural Heritage & Endangered Species Program (NHESP), Core Habitat and Supporting Natural Landscape areas identified by the NHESP's BioMap Project, Rare Reptile and Amphibian Reserves identified by the NHESP, and Potential and Certified Vernal Pools. Many of these resource categories or features overlap within the

Squannassit area. These resources are described in further detail below and in section IV. Summary of the Criteria for Designation.

- General Wildlife Habitat

The Squannassit Nomination Report includes a summary and excerpts of a report, Focus Areas for Wildlife Habitat Protection in the Nashua River Watershed, September 2000, prepared by Jeffrey Collins of the Ecological Extension Services of the Massachusetts Audubon Society. According to the nomination report, this habitat protection study provides substantial base information about the nominated area, and describes 13 specific areas, larger blocks of unfragmented land important for wildlife habitat, located within or partially within the nominated area. A map of these areas is shown in the nomination report, Figure 11, Wildlife Habitat Focus Areas. According to the Wildlife Habitat Protection report, "biodiversity at multiple levels will best be maintained in a system of large, undisturbed core areas, surrounded by buffer zones of limited disturbance, and connected by functional corridors for wildlife dispersal." Focus areas within the Squannassit ACEC range in size and location from the 8,700-acre Townsend State Forest focus area in Townsend and New Hampshire to the 1,900-acre Throne Hill area in Groton and Pepperell, and include important riparian corridors along the Squannacook and Nissitissit Rivers and Nashua River/Mulpus Brook. Approximately 22,300 acres or 60% of the ACEC is located within these habitat focus areas. The study is an important reference for ongoing and future stewardship activities within the ACEC and in adjacent areas.

According to the nomination report, the Nashua River is designated as part of the North American Waterfowl Management Plan, and provides breeding and migration habitat for migratory waterfowl. The presence of species such as black bear, bobcat, moose, otter and fisher are indicative of the high quality of the habitat. The excellent cold water and warm water fisheries in this region are further described in the Fishery Habitat section below.

- Rare Species

According to comments provided by the NHESP, documented records from the Natural Heritage database indicate that there are 23 state-listed rare species known to occur within the boundaries of the Squannassit ACEC. This number includes 7 Endangered Species, 3 Threatened, and 13 listed as species of Special Concern. Priority Habitats and Estimated Habitats for Rare Wildlife mapped by the NHESP cover approximately 6,010 acres or 16% of the ACEC. Priority Habitats represent areas of known state-protected rare plant and animal species occurrences in Massachusetts. Estimated Habitats depict estimated habitats of state-protected rare wildlife occurring in wetlands areas, designed for use with the Wetlands Protection Act Regulations (310 CMR 10.00). Additional significance of these state-listed species is described in section IV. Summary of the Criteria for Designation.

- Core Habitat and Supporting Natural Landscape

The BioMap project of NHESP, published in 2001, delineated as Core Habitat those areas of the state which, if protected, would protect the most viable populations of rare plants and animals, the best examples of natural communities, and the breadth of biodiversity of the state. Twenty-three percent of the entire state was delineated as Core Habitat. In the Southern New England Coastal Plains and Hills ecoregion, which includes the Squannassit ACEC, only 15% of the ecoregion is Core Habitat. About 17,160 acres or 46% of the Squannassit ACEC is BioMap Core Habitat. The significant extent of Core Habitat within the ACEC is further described in section IV. Summary of the

Criteria for Designation. In addition, about 12,380 acres or 33% of the ACEC is designated as Supporting Natural Landscape, which are large, generally unfragmented areas that safeguard the Core Habitat while also including habitat for the common species of Massachusetts. Combined Core Habitat and Supporting Natural Landscape cover approximately 80% of the ACEC. The BioMap report is an important reference for ongoing and future stewardship activities within the ACEC and in adjacent areas.

- Rare Reptile and Amphibian Reserves

According to the NHESP comment letter,

> From 1998 through 2000, the NHESP surveyed sites across the state for state-listed rare reptiles and amphibians, eventually choosing nine areas as potential "herp reserves" because of the presence of multiple rare herptile species, relative lack of habitat fragmentation, and diversity of wetland types interspersed with undeveloped uplands. The reserve areas were delineated around known rare species sites based on dispersal distances and habitat use for each rare herptile species represented at a site, so that the population of each species could have a high likelihood of long-term persistence.
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> The proposed 6,700-acre Squannacook Herp Reserve is almost completely incorporated into the eastern portion of the proposed Squannassit ACEC, with a small part of this herp reserve included in the proposed Petapawag ACEC. This reserve was delineated to protect populations of Blanding's Turtles (*Emydoidea blandingii*, Threatened) and Spotted Turtles (*Clemmys guttata*, Special Concern), and appears to contain the highest density of vernal pools of all nine herp reserves.

The significance of this Rare Reptile and Amphibian Reserve within the ACEC is further described in section IV. Summary of the Criteria for Designation.

- Vernal Pools

According to information provided in the NHESP comment letter,

> Vernal pools are temporary, fishless depressions which typically hold water for several weeks to several months out of a year. Because of the lack of fish predators, several species of reptiles and amphibians breed exclusively, or often, in vernal pools. Other reptiles and amphibians use vernal pools for feeding or rehydration during their travels over the course of a year. The relative scarcity of vernal pools, and their susceptibility to destruction by development or pollution, probably contributes to the rarity of the following state-listed rare vertebrates which use vernal pools in Massachusetts: Marbled Salamander (Threatened), Spadefoot Toad (Threatened), Blue-spotted Salamander (Special Concern), Jefferson Salamander (Special Concern), all of which breed only in vernal pools; and Blanding's Turtle (Threatened), Four-toed Salamander (Special Concern), Spotted Turtle (Special Concern), and Wood Turtle (Special Concern), which use vernal pools for feeding or (Four-toed Salamanders, sometimes) breeding.

There are 23 NHESP Certified Vernal Pools within the ACEC. Also within the ACEC are 369 Potential Vernal Pools as mapped by the NHESP through photointerpretation by the NHESP in the 2001 Massachusetts Aerial Survey of Potential Vernal Pools. The significance of vernal pools within the ACEC is further described in section IV. Summary of the Criteria for Designation.

Fishery Habitat

The Squannacook and Nissitissit rivers and 16 tributary streams are classified as cold water fisheries that support trout, including brown, brook and rainbow trout. These rivers were designated Outstanding Resource Waters for these fisheries. Trout are stocked in 12 streams and wild trout occur in 5 streams and the rivers. Ponds, rivers and streams provide habitat for warm water fish such as large-mouth bass, chain pickerel, brown trout, fallfish, carp, bullhead, yellow perch, bluegill, and bridle shiner.

Agricultural Areas - Farmland and Forestland

Farming and forest management are an integral part of overall resource preservation and management within an ACEC. According to GIS land use data prepared for the review of the nomination, there are approximately 27,570 acres of forestland and 2,310 acres of farmland within the ACEC, which cover 74% and 6% of the ACEC, respectively.

- Forestland

A very large percentage - 74% - of the ACEC is forestland. The preservation and sound management of this resource will in turn have a significant effect on a wide variety of other important resources, ranging from the quality of surface water and groundwater supplies to wildlife habitat.

Recognizing the importance of preserving as much of this forestland as possible, the entire Nashua River Watershed has been included as a Forest Legacy Area under the Forest Legacy Program administered by the United Sates Forest Service in partnership with DEM's Bureau of Forestry. The purpose of the Program is to conserve private, working forestlands principally through the acquisition of conservation restrictions. All of the Squannassit ACEC is included within this Forest Legacy Area.

As a subset of the total amount of forested land within the ACEC, according to MassGIS open space data the amount of land under the Chapter 61 forestland tax classification is approximately 1,100 acres, or 3% of the ACEC.

A recent study by the Harvard Forest provides additional information regarding the amount of forest cutting undertaken under the Forest Cutting Practices Act (through forest cutting plans approved by the DEM Bureau of Forestry). According to this landscape-scale research project, during the period from 1984 to 2001, forest harvesting approved under DEM review was undertaken on approximately 4,280 acres of forestland within the ACEC.

- Farmland

There are approximately 2,310 acres of farmland within the ACEC, 6% of the total ACEC acreage. This MassGIS land use coverage data can be separated into the following categories: cropland, 1,385 acres; pasture, 650 acres; orchard, 215 acres; and nursery, 60 acres. The largest amounts of cropland within the ACEC are located in Pepperell (approximately 405 acres) and Townsend (385 acres). The largest amounts of pasture within the ACEC are located in Pepperell (approximately 275 acres) and Townsend (195 acres).

The amount of land under the Chapter 61A farmland tax classification is approximately 1,460 acres, with the largest amounts located in Pepperell (approximately 550 acres), Lunenburg (480 acres), and Groton (330 acres).

The amount of farmland within the ACEC is relatively small, compared to other areas of the state, but from an ACEC stewardship perspective, it is an important element of the overall resource framework.

Recognizing the importance of preserving as much high quality farmland as possible, the Department of Food and Agriculture (DFA) has defined portions of the Squannassit ACEC as an Agricultural Preservation Restriction (APR) focus area. According to DFA, an APR focus area or block, is an area that encompasses Class I-IV soils (as defined by the United States Department of Agriculture, Natural Resource Conservation Service), is currently being farmed, and generally consists of several farms. The acreage varies but is generally over 30 acres of tillable cropland. Within the Squannassit ACEC, currently portions of 2 farm properties in Pepperell (approximately 150 acres) are protected under the APR Program, administered by DFA.

Water Supply Areas

There are highly significant drinking water resources present within the ACEC. These include portions of several high-yield aquifers as defined by the United States Geological Survey (USGS) in the areas of Pearl Hill-Willard Brook and Witch Brook in Townsend, Stewart Brook in Pepperell, the Squannacook and Nashua Rivers in Groton, Shirley and Ayer, and Grove Pond in Ayer. The area of these high-yield aquifers is 1,800 acres, or 5% of the ACEC. Extensive medium-yield aquifers are located along the length of the Squannacook River in Townsend, Groton, and Shirley, Sucker Brook and the Nissitissit River in Pepperell, and Morse and Catacunemaug Brooks in Shirley. The area of these medium yield aquifers is 4,450 acres, or 12% of the ACEC. The combined area of high- and medium-yield aquifers within the ACEC is approximately 6,250 acres, or 17% of the ACEC.

Drawing upon the extensive ground water supplies of the ACEC, according to GIS mapping and recent data from the Department of Environmental Protection (DEP), there are eight municipal wells and two public water supply facilities for the Devens Enterprise Zone (DEZ) located within the ACEC:

Town	**# of wells**	**% of total town public water supply provided**
Ayer	2	57%
Groton	1	32%
Pepperell	1	57%
Shirley	2	99%
Townsend	2	75%
Devens Enterprise Zone (Ayer,Harvard,Shirley)	2 in Ayer	51%

According to recent DEP data, together all of these wells produced approximately 1,057 million gallons of water annually, about 58 % of the combined annual amount produced by the municipal systems in these towns and by the DEZ. Additional community wells are located just outside of the ACEC in Townsend and Shirley, and combined with the wells inside the ACEC, provide 100% of the public water supply for these towns. The Zone II and Interim Wellhead Protection Areas for all of these wells cover approximately 5,300 acres, or 14% of the ACEC. The combined area of high- and medium-yield aquifers and the Zone II and Interim Wellhead Protection Areas for current water supply facilities totals approximately 9,380 acres, or 25% of the ACEC.

There are also other types of public water supplies located within the ACEC, in Ashby and Townsend, classified by the state DEP as non-transient, non-community (NTNC) or transient non-community (TNC), serving smaller populations. There are seven of these wells within the ACEC. The six TNC wells are located at Pearl Hill State Park (2) and Willard Brook State Forest (2), and at a private campground and a farm stand in Ashby. The NTNC well serves a nursery school in Ashby. Extensive areas throughout the ACEC are not served by public systems, and private wells for residences and businesses use groundwater for water supplies.

The significance of public water supplies within the ACEC is further described in section IV. Summary of the Criteria for Designation.

Historical/Archaeological Resources

According to nomination review comments provided by DEM's Office of Historic Resources archaeologist Thomas Mahlstedt, glacial history provides the context for an understanding of archaeological and historic resources within the Nashua River region and the area of the Squannassit ACEC. He states,

> The composition of the bedrock, together with glacial and post-glacial deposition, and erosion have created a mosaic of landforms, sediments and soils. These characteristics combined with a diverse flora and fauna base, gave the region a complexity and variety that contributed to the many forms of land use practiced throughout the 12,000 years that humans have occupied the region ….
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> The biota of the region includes wetlands, pine and hardwood forests, pioneer hardwood and herbaceous forests, and open floral communities. The wetlands, riverine floodplains, and interior wooded uplands attract, or did attract, virtually every form of wildlife known in the northeastern part of the United States …. Paleo Indian hunters and gatherers may have reached the Nashua River Drainage sometime between 12,000 to 9,500 years ago.

Given the unique environmental characteristics and favorable site location criteria of the Squannassit and Petapawag regions, he suggests that the area contains exceptionally high archaeological potential, both for the numbers of sites yet to be discovered, as well as for sites that are known to retain high archaeological integrity and research value – in other words, "the region is a veritable archaeological museum."

The Nashaway, a band of a broader group of Algonquin speaking peoples, inhabited the area prior to colonial settlement. The Nipmuc, Massachusetts and Pennacook tribes may have all hunted or inhabited portions of the area.

The nomination report states that many of the important historic features in the Squannassit area are located along the major rivers and streams. Within the ACEC, portions of the Townsend Harbor and West Townsend Historic Districts are located along the Squannacook River, and a portion of the Shirley Village Historic District is located along Catacunemaug Brook. Historic mill-sites are found along rivers and streams throughout the area.

In written comments regarding the nomination submitted by the Massachusetts Historical Commission (MHC), MHC states that the ACEC includes a wide range of significant historic and archaeological properties. Known archaeological sites within the area, associated with Native American settlement of the area, date back 3,000 years. The MHC's Inventory of the Historic and Archaeological Assets of the

Commonwealth lists more than 350 properties within the Squannassit and Petapawag nominated areas, including historic districts or portions of historic districts in the Squannassit area. MHC states, "Surviving eighteenth and nineteenth century structures and landscapes have helped preserve the historic character of this area," and concludes that the two ACECs contain significant historic and archaeological resources.

In addition, as stated in the Squannassit Nomination Report, the Nashua River corridor is located at the center of the Freedom's Way National Heritage Area, which highlights American history through the themes of Rediscovering the Native Landscape, Inventing the New England Landscape, and Shaping the Landscape of Democracy.

Subsequent to the submission of the Squannassit Nomination Report to my office on March 25, 2002, the nominators provided a great deal of additional local archaeological and historical information. These materials are on file with the ACEC Program.

Special Use Areas

The ACEC regulations cite "undeveloped or natural areas, public recreational areas, or significant scenic sites" as examples of "special use areas." These areas are a central feature of the ACEC.

- Undeveloped or Natural Areas

As described above in this Resource Overview section, especially under Habitat Resources, there are extensive undeveloped or natural areas located throughout the Squannassit ACEC. These areas also overlap with the major protected open space lands described below under Public Recreational Areas. Undeveloped or natural areas are a central feature of the ACEC.

- Public Recreational Areas

There are extensive public recreational areas within the ACEC. The GIS maps provided for the nomination review show the location and extent of federal, state, municipal and privately owned open space, almost all of which is open to the public. Municipal open space not open to the public may include land owned and managed for public water supply protection. Privately owned open space generally refers to lands owned by local or regional nonprofit land trusts and conservation organizations. Protected open space does not refer to properties under Chapter 61A (farming), 61 (forestry), and 61B (recreation) tax classification status. The United State Fisheries and Wildlife Service, the state DEM's Division of Forests and Parks, the state Division of Fisheries and Wildlife (DFW), and several towns and nonprofit organizations own and manage significant areas of land.

Most of the towns included in the nomination area updated their local open space data during the summer and fall of 2002 to help provide the most current mapping for the reviews of the Squannassit and Petapawag ACEC nominations. Protected open space acreages and percentages within the ACEC, according to MassGIS data for the Squannassit ACEC, are as follows:

Total	14,660 acres, or 39% of the ACEC
Federal	440 acres, or 1%
State	9,980 acres, or 27%
Municipal	3,240 acres, or 9%

Private Nonprofit 390 acres, or 1%

Detailed breakdowns by town and by ownership are available for further analysis and study, and for use in ongoing and future land and resource protection activities and programs.

Major conservation and recreation properties located within the ACEC

- USFWS Oxbow National Wildlife Reserve (440 acres)
- DEM Willard Brook State Forest (2,830 acres), Townsend State Forest (2,950 acres), Townsend State Forest (Squannacook Parcels, 320 acres), and Pearl Hill State Park (1,000 acres)
- DFW Ashby Wildlife Management Area (WMA) (930 acres), Hunting Hills WMA (355 acres), Mulpus Brook WMA (180 acres), Nissitissit River WMA (365 acres), and Squannacook River WMA (1,045 acres)
- Groton Town Forest area (550 acres) and Throne Hill properties (335 acres)
- Lunenburg Cowdrey Nature Center area (595 acres)
- Pepperell Guld Brook/Bemis Road/Stewart Brook area (260 acres) and Heald Pond/Heald Street Orchard area (160 acres)
- Shirley Pumpkin Brook/Townsend Road area (185 acres), Rich Tree Farm (110 acres), and Valley Farm/Holden Road area (255 acres)
- Townsend Meetinghouse Park (245 acres)

In addition, the Nashua, Squannacook and Nissitissit rivers are regionally significant recreation areas accessible to and highly used by the public, for recreational activities such as canoeing, fishing, hunting and nature study.

- Significant Scenic Sites

Within the Squannassit ACEC, portions of Ayer, Groton, Lunenburg, Pepperell, Shirley and Townsend have been included in the 1982 Massachusetts Scenic Landscape Inventory prepared by the Department of Environmental Management. In the Inventory, "Distinctive" and "Noteworthy" classifications and maps are provided for about 9% of the Commonwealth's best scenic landscapes, both of which are located within the ACEC. According to a digital layer of these landscapes adapted and incorporated into MassGIS, approximately 6,510 acres, or 17% of the ACEC, are Distinctive or Noteworthy scenic landscapes.

III. Boundary of the Squannassit ACEC

Upon review of the boundary as recommended in the nomination letter, oral testimony presented at the public hearing, correspondence submitted to the Secretary, and information gathered in the course of EOEA agency review, the final boundary of the Squannassit ACEC is very similar to the boundary proposed in the nomination. Other than technical clarifications (such as of road names and of 200-foot Riverfront Areas and 100-foot wetland Buffer Zones), the final boundary includes one adjustment described below. According to Geographic Information System (GIS) data provided by MassGIS and DEM, the final ACEC boundary includes approximately 37,450 acres.

Discussion of Final ACEC Boundary

- Boundary Modifications

The final ACEC boundary, as compared to the boundary proposed in the March 25, 2002 ACEC

nomination, was modified in one location. In the town of Townsend, the proposed boundary was intended to follow an unnamed perennial stream and the 200-foot Riverfront Area along this stream corridor north of Meetinghouse Park to Highland Street. In the course of the review of the nomination, it was discovered that this perennial stream had been determined by the local Conservation Commission and the Department of Environmental Protection (DEP) not to be a perennial stream, but an intermittent stream. In order to include a wetlands and wildlife corridor from Meetinghouse Park north to Highland Stream within the boundary of the ACEC, the boundary text of the ACEC boundary was changed so that the ACEC boundary follows the edge of the 100-foot Buffer Zone of Bordering Vegetated Wetlands north from Meetinghouse Park to Highland Street. This boundary modification results in a very slight increase in the overall size of the ACEC.

- Proposals to Modify the Nominated Boundary

1. National Grid

Through testimony at a public hearing and in written correspondence by National Grid USA Service Company, Inc. ("National Grid")[1], I received comment expressing a concern as to the potential effect that ACEC designation, and a related "higher level of review attendant to [such] projects," may have upon permitting of activities in rights of way or corridors associated with the distribution or transmission of electricity. Specifically, National Grid appears concerned primarily as to how the ACEC designation will impact consideration of such activities by local and state governmental agencies, particularly under the Wetlands Protection Act, G.L c. 131, s. 40 and its regulations at 310 CMR 10.00, and the Massachusetts Environmental Policy Act ("MEPA") G.L. c. 30, ss. 61-62H and its regulations at 301 CMR 11.00. National Grid asserts that it conducts its management activities in an environmentally responsible manner and expresses its concern that the ACEC designation may serve, or may be used by others to serve the purpose, to add delay and cost to maintain, improve and upgrade its existing facilities, such as poles, wires, substations and ancillary support and construct new facilities within these currently managed and actively utilized corridors to meet the electric needs of the citizens of the Commonwealth.

Companies such as National Grid provide an essential service to the citizens of the Commonwealth through the distribution and transmission of electricity. Through the review of this ACEC nomination, I note that the existing managed corridors through which electricity is transmitted along wires strung from poles or other supporting structures are maintained to provide low growing vegetation without taller trees that may impact the transmission system. I note that such corridors when appropriately managed may provide important wildlife habitat and may sustain landscape biodiversity.

In response to the general concerns expressed by National Grid, I would like to state clearly that the inclusion of current electric transmission and distribution corridors within the boundary of the ACEC is intended neither to create a higher or different standard of review for projects within the currently managed and actively utilized corridors for transmitting or distributing electricity that qualify as public utility limited projects under the Wetlands Protection Act regulations, as described in 310 CMR 10.53(3)(d), nor to serve as the basis to deny such limited projects (i.e. operation and maintenance of transmission or distribution poles, wires, substations and ancillary facilities) that

[1] National Grid Companies include, in part, New England Power Company, Massachusetts Electric Company, and New England Hydro-Transmission Electric Company.

could otherwise have been permitted notwithstanding this ACEC designation decision.[2] Similarly, this ACEC designation is not intended to create a higher or different standard of review for such limited projects under MEPA. Therefore, when EOEA's MEPA Office is reviewing an Environmental Notification Form ("ENF") under MEPA and 301 CMR 11.00 for a project that (1) qualifies as a "limited project" under 310 CMR 10.53(3)(d)[3] and (2) that exceeds **only**[4] the MEPA threshold at 301 CMR 11.03(11), a rebuttable presumption will exist that the potential environmental impacts of such a project, within the standards of 301 CMR 11.06, will not require the preparation of an Environmental Impact Report ("EIR").[5] This presumption may be overcome only with substantial direct evidence submitted during the comment period on the ENF that aspects of the project which are within the applicable jurisdictional limitations of MEPA and 301 CMR 11.00 are likely, directly or indirectly, to cause significant damage to the environment and accordingly warrant the preparation of an EIR. I encourage project proponents, such as National Grid, and the relevant local and state agencies to work proactively to appropriately address and mitigate potential environmental impacts, such as wetlands impacts.

2. Massachusetts Development Finance Agency (MassDevelopment)

In written testimony, I received comment from the Massachusetts Development Finance Agency (MassDevelopment) opposing the proposed inclusion of any portion of the Devens Enterprise Zone (DEZ) within the Squannassit or Petapawag ACEC nomination areas. MassDevelopment expressed concerns about the potential regulatory effects of ACEC designation upon the economic development goals and activities of the DEZ as set forth in Chapter 498 of the Acts of 1993. In response to these concerns, in correspondence dated September 26, 2002 I assured MassDevelopment that the twin goal of environmental protection and economic development go hand in hand. Throughout the years EOEA has worked proactively to support MassDevelopment's goals for the DEZ. In the precedent-setting Massachusetts Environmental Policy Act (MEPA) review of the DEZ Reuse Plan, EOEA certified that all future development projects in the DEZ will not have to undergo individual MEPA review, regardless of size, so long as they are consistent with the approved plan. ACEC designation will not affect the MEPA status of such projects. ACEC designation is not intended to complicate permitting or interfere with the 75-day expedited review process of the Devens Enterprise Commission. The DEZ areas included within the Squannassit ACEC contain highly sensitive and important resources. The inclusion of these areas within the ACEC highlights the environmental significance of these resources and encourages environmentally sound development in this portion of the DEZ. The ACEC will not conflict with the important balance between conservation and residential, commercial and industrial uses at Devens, as determined by the

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[2] This statement is intended as guidance for Conservation Commissions and the Department of Environmental Protection for their reviews conducted under the Wetlands Protection Act and associated regulations. Nothing in this statement purports to effect the application of 310 CMR 10.53(3)(d), particularly the review of projects relative to projects in rare species habitat.

[3] EOEA will identify whether a proposed project qualifies as a "limited project" for MEPA review purposes from the review documents and from comments, with particular emphasis upon comments received from the Department of Environmental Protection.

[4] This rebuttable presumption would not apply if another MEPA review threshold was exceeded (e.g. any of the discretionary thresholds at 301 CMR 11.03(3)(b)) while noting that the thresholds at 301 CMR 11.03(3)(a) require preparation of an EIR.

[5] This rebuttable presumption applies only for purposes of MEPA and determining whether an EIR must be prepared under MEPA. This presumption does not and could not serve any other purpose or effect any presumption under the Wetlands Protection Act, including whether and to what extent a project may alter a wetlands resource area or have an adverse effect, the availability of reasonable alternatives, or the extent to which mitigation measures are necessary.

Devens Reuse Plan. Finally, it should be noted that only a portion of the DEZ has been included within the Squannassit ACEC, and the portions of the DEZ that are not included are not affected by this designation.

3. Massachusetts Department of Highways (MassHighway)

The Massachusetts Department of Highways (MassHighway) requested that state highways under MassHighway jurisdiction be excluded from within the ACEC. Since the construction of improvements to state highways may have impacts to sensitive resources within the ACEC, it is important to include these roadways within the ACEC. It is important to note that routine maintenance is not subject to the ACEC review thresholds set forth in the Massachusetts Environmental Policy Act (MEPA) Regulations.

4. Individual Landowners Requesting Exclusion

Several individual landowners requested that their property be excluded because they were opposed to the nomination and designation process, thought that the proposed area was too broad, or thought that their land did not include at least four important resource features (the ACEC Regulations state that to be eligible for nomination, an area shall contain at least four features listed in the regulations). Although the size of the Squannassit ACEC is the largest ACEC designated to date, the boundaries proposed by the nominators were

consistent with the central resource features and goals of the nomination, and followed ACEC Program guidelines to delineate the proposed boundary.

5. Important Existing and Potential Water Supply Resources Located outside of the ACEC

In oral and written testimony various citizens and town officials suggested expanding the boundary of the ACEC to include important existing or potential future water supply areas. In particular, officials from the Town of Ayer suggested expanding the boundary to include the former Moore Airfield area of the Devens Enterprise Zone and the Spectacle Pond area. These suggestions were based upon pressing needs to protect and preserve municipal water supplies, and merit future consideration as potential amendments to the ACEC boundary as part of a more comprehensive assessment of ground water resources and public water supplies located just outside or nearby the ACEC boundary.

EOEA agency review of the nomination highlighted both the regional significance of aquifers and public water supplies located within the ACEC and those located just outside or nearby the ACEC boundary. These areas include a portion of the Witch Brook aquifer in Townsend, the Catacunemaug/Lake Shirley aquifer in Shirley and Lunenburg and associated public water supplies, and the Hickory Hills Lake aquifer in Lunenburg.

6. Additional Proposals to Expand the Proposed Boundary

Several additional suggestions to expand the proposed ACEC boundary were submitted in the course of the review. As stated above, many of these proposals were thoughtful and based upon local knowledge of environmental resources, and merit future consideration as potential amendments to the ACEC boundary that would receive full public review.

Overview of Squannassit ACEC Boundary Description

The Squannassit ACEC boundary generally includes portions of the watersheds of the Nissitissit, Squannacook, Mulpus and Catacunamaug rivers and streams as they flow easterly into the Nashua River. The entire area is located within the Nashua River Watershed. The nominators used these river and stream corridors, protected open space, overland linkages, and a variety of resource

overlays, including important biodiversity resources, to propose the ACEC nomination boundaries. The final ACEC area is not one contiguous block of land; there are nine areas delineated within the larger boundary area that are not included as part of the ACEC. It is important to state that in many locations there are highly important resources just outside of or nearby the final ACEC boundary.

According to Geographic Information System (GIS) data provided by MassGIS and DEM, the final ACEC boundary includes approximately 37,450 acres, with approximate amounts in each town as follows:

Ashby	2,930 acres
Ayer	690
Groton	3,990
Harvard	250
Lancaster	10
Lunenburg	4,010
Pepperell	6,030
Shirley	4,490
Townsend	15,050

- **Great Ponds and Navigable Rivers and Streams as Determined by the State Waterways (or Chapter 91) Regulations (310 CMR 9.00)**

The final boundary includes several Great Ponds and navigable rivers and streams as determined by the Massachusetts Waterways (or Chapter 91) Regulations (310 CMR 9.00), administered by the state Department of Environmental Protection. **These Great Ponds and waterways will be included within the boundary of the Squannassit ACEC, but the effective date for these areas will be within a period of up to five years following the date of this ACEC designation**. Further study and resource management planning for these water bodies is needed before they can be included within the boundary of the ACEC. **The effective date that these water bodies will be included as part of the ACEC is as follows (whichever date is earliest), in accordance with 301 CMR 12.11(1)**:

a) five years from the initial effective date of designation; or
b) the effective date of approval by the Secretary of Environmental Affairs of a Resource Management Plan (RMP) for a specific water body, after the RMP has been adopted by the municipality or municipalities where the water body is located; or
c) the date of publication in *The Environmental Monitor* of a Finding by the Secretary that adequate study and public education, outreach and participation have been completed for a specific water body or water bodies, and that formal Resource Management Plan adoption and approval is not necessary.

- **Boundary Definitions**

The boundary of the Squannassit ACEC generally follows:

- streets, roads, railroad, and utility rights-of-way or easements;
- state and town boundary lines;
- property boundaries of public protected conservation and recreation properties owned by the United States Fish and Wildlife Service, the state Department of Conservation and Recreation (formerly

Department of Environmental Management), the state Division of Fisheries and Wildlife, and the Municipality of Townsend;

- a line following the outer edge of the Buffer Zone (as defined in 310 CMR 10.04, that area of land extending 100 feet horizontally from the boundary of any area specified in 310 CMR 10.02 (1)(a) - areas specified in 310 CMR 10.02(1)(a) include any bank, freshwater wetland, marsh, or swamp bordering on any creek, river, stream, pond or lake); and/or
- a line following the outer boundary of Riverfront Area (as defined in 310 CMR 10.58(2)(a) and 10.58(2)(a)3. – for most locations, Riverfront Area is the area of land between a river's mean annual high-water line measured horizontally outward from the river (perennial stream) and a parallel line located 200 feet away).

Where the ACEC boundary is defined by the location of natural resource features (e.g. *wetland resource areas*), the boundary may be subject to clarification based on the most current definitions and data for the resource areas. For a review of site specific projects within the ACEC, the ACEC boundary may need to be determined in the field or in consultation with the ACEC Program. Actual field verification of the 100-foot wetlands Buffer Zone or the 200-foot Riverfront Area would be determined during the course of filing, by a project proponent to the Conservation Commission of the appropriate town, either a Request for Determination of Applicability or a Notice of Intent following the procedures specified in the Wetlands Protection Act, M.G.L. Ch. 131, sec. 40, and its regulations at 310 CMR 10.00. *Only for purposes of delineating this ACEC boundary*, the 200-foot Riverfront Area takes precedence over the 100-foot wetlands Buffer Zone. However, where a 200-foot Riverfront Area is specified as the ACEC boundary, based upon the location of a presumed perennial stream, and said stream is later determined by the Conservation Commission or the DEP to be intermittent and therefore would not contain Riverfront Area, the ACEC boundary will revert to the 100-foot wetlands Buffer Zone in that location.

Unless otherwise specified, the ACEC boundary as described extends to and includes the entire width of the *rights-of-way* of public and private streets, roads and highways and other rights-of-way such as railroads and utility easements. Where rights-of-way are used to delineate the boundary for areas within the external perimeter that are not intended for inclusion within the ACEC, the entire width of the rights-of-way are intended to be included as part of the ACEC.

The final boundary is approximated by the digital boundary shown on the attached maps based on the Ashburnham, Ayer, Fitchburg, and Townsend 1988 USGS 7.5 minute series, 1:25,000-scale metric topographic quadrangle maps. An official map is on file at the offices of the DEM, Division of Resource Conservation, ACEC Program, and can be viewed online at the ACEC Program web site: www.state.ma.us/dem/programs/ACEC. The digital ACEC boundary will be available in 2003 in the ACEC datalayer that can be downloaded from the MassGIS web site: www.state.ma.us/mgis. Because approximate locations of wetlands shown on these maps are based on best available digital data, the digital ACEC boundary will be updated in the future when better digital wetlands data becomes available.

Boundary Description of the Squannassit ACEC

The Squannassit ACEC is bounded by an external perimeter, within which are located nine discreet areas not included as part of the ACEC. These areas are described below following the description of the external perimeter delineation.

External Perimeter Boundary of the Squannassit ACEC

State line	1. Commencing at the perimeter's western, most northern point in **Ashby**, in the region of "Juniper Hill", specifically at the junction of Rte. 31/Greenville Rd. and the northern border of Massachusetts/southern border of New Hampshire, proceed eastward along the Massachusetts/New Hampshire state line crossing into **Townsend**, and then **Pepperell** until its junction with Rte. 122/Hollis St. in Pepperell.
Road	2. Thence southward on Rte. 122/Hollis St. until its junction with Mill St.
Road	3. Thence southward on Mill St. until the intersection with Rte. 111/Nashua St. and Mill St. at "Four Corners".
Road	4. Thence southward on Mill St. until reaching the junction with Groton St.
Road	5. Thence northwesterly on Groton St. to Hollis St.
Connecting Line	6. Thence crossing Hollis St. northwesterly to Brookline Rd.
Road	7. Thence northwesterly on Brookline Rd. until reaching its junction with Park St.
Road	8. Thence southward on Park St. until its intersection with Oak Hill St.
Road	9. Thence westward on Oak Hill St. until reaching the intersection with the 200-foot Riverfront Area east of Sucker Brook.
200-ft Riverfront Area	10. Thence southward along the 200-foot Riverfront Area east of Sucker Brook until reaching Sheffield St.
Road	11. Thence southward on Sheffield St. until reaching its junction with Heald St.
Road	12. Thence eastward on Heald St. until its junction with Willow St.
Road	13. Thence southward on Willow St. until its junction with Jewett St.
Road	14. Thence westward on Jewett St. until its junction with Shattuck St.
Road	15. Thence southward on Shattuck St. until reaching its intersection with Rte. 113.
Road	16. Thence southwesterly on Rte. 113 until reaching the intersection with the 200-foot Riverfront Area north of Bancroft Brook.
200-ft Riverfront Area	17. Thence southeasterly along the 200-foot Riverfront Area north of Bancroft Brook until reaching its crossing of Rte. 119.
Road	18. Thence eastward on Rte. 119 until reaching the centerline of the Nashua River at the **Pepperell/Groton** town line.

River at the **Pepperell/Groton** town line.

River Centerline 19. Thence southward on the centerline of the Nashua River, which for a short stretch is the town line of Pepperell and Groton, thence into **Groton**, continuing southward along the centerline of the Nashua River, which for a short stretch is also the **Groton/Ayer** town line and the **Ayer/Shirley** town line, until its crossing of Rte. 2A.

Road 20. Thence eastward on Rte 2A in **Ayer** to the intersection with the 200-foot Riverfront Area east of the Nashua River.

200-ft Riverfront Area 21. Thence continue in a southwesterly direction along the 200-foot Riverfront Area east of the Nashua River until reaching the boundary of the US Fish & Wildlife Service (USF&WS) Oxbow National Wildlife Refuge (NWR) property.

Public Property Line 22. Thence follow a southward course on the USF&WS Oxbow NWR property boundary to its intersection with the 200-foot Riverfront Area east of the Nashua River.

200-ft Riverfront Area 23. Thence southeasterly along the 200-foot Riverfront Area until intersecting the USF&WS NWR property line.

Public Property Line 24. Thence continuing northeasterly, easterly, and southerly along the USF&WS property line to the intersection with Bishop Rd.

Road 25. Thence eastward along Bishop Rd. until reaching the MBTA railroad right-of-way.

Railroad Right-of-Way 26. Thence southward along the eastern edge of the MBTA railroad right-of-way until the crossing with West Main St.

Road 27. Thence westward on West Main St. until reaching the intersection with the 200-foot Riverfront Area east of Nonacoicus Brook.

200-ft Riverfront Area 28. Thence southeasterly along the 200-foot Riverfront Area east of Nonacoicus Brook until reaching the 100-foot wetlands Buffer Zone of Plow Shop Pond.

100-ft Wetlands Buffer Zone 29. Thence on a course generally eastward along the 100-foot wetlands Buffer Zone north of Plow Shop Pond and the 100-foot wetlands Buffer Zone north of Grove Pond to the 200-foot Riverfront Area of the connecting stream that flows from the north.

200-ft Riverfront Area 30. Thence northward along the 200-foot Riverfront Area to the west of this stream to its intersection with the 100-foot wetlands Buffer Zone of the unnamed pond on the USGS topographic map (Balch Pond, locally) to the north.

100-ft Wetlands 31. Thence northward, eastward, and southward along the 100-foot wetlands

Buffer Zone	Buffer Zone around Balch Pond back to the eastern Riverfront Area of the connecting stream.
200-ft Riverfront Area	32. Thence southward back along this 200-foot Riverfront Area, crossing two other streams, keeping to the east of this stream segment that connects back to the 100-foot wetlands Buffer Zone to the south of Grove Pond.
100-ft Wetlands Buffer Zone	33. Thence westward along the 100-foot wetlands Buffer Zone to the south of Grove Pond and generally northwesterly along the 100-foot wetlands Buffer Zone of Plow Shop Pond until reaching the 200-foot Riverfront Area west of Nonacoicus Brook.
200-ft Riverfront Area	34. Thence northwesterly along the 200-foot Riverfront Area west of Nonacoicus Brook until reaching West Main St.
Road	35. Thence westward on West Main St. until reaching the 200-foot Riverfront Area east of the Nashua River.
200-ft Riverfront Area	36. Thence southwesterly along the 200-foot Riverfront Area east of the Nashua River into **Harvard** until reaching the boundary of the USF&WS Oxbow NWR property.
Public Property Line	37. Thence southward along the eastern property line of the USF&WS Oxbow NWR property until reaching Jackson Rd.
Road	38. Thence southward on Jackson Rd. to the eastern fork of the road where it continues as the entrance ramp from Exit 37 at Rte 2 westbound and continuing southeasterly on that ramp until reaching Rte. 2.
Road	39. Thence westward on the southern edge of the right-of-way of Rte. 2 until reaching the 200-foot Riverfront Area west of the Nashua River in **Lancaster**.
200-ft Riverfront Area	40. Thence in a northerly direction into **Shirley** along the 200-foot Riverfront Area west of the Nashua River until reaching the 200-foot Riverfront Area south of the lower Catacoonamug Brook.
200-ft Riverfront Area	41. Thence westward along the 200-foot Riverfront Area south of Catacoonamug Brook to the intersection of the 100-foot wetlands Buffer Zone of Phoenix Pond.
100-ft Wetlands Buffer Zone	42. Thence westward following the 100-foot wetlands Buffer Zone south of Phoenix Pond until the intersection with the 200-foot Riverfront Area to the south of Catacoonamug Brook.
200-ft Riverfront Area	43. Then continuing northwesterly along the 200-foot Riverfront Area south of Catacoonamug Brook until reaching Leominster Rd.
Road	44. Thence westward on Leominster Rd. until its junction with Catacunemaug Rd.

Catacunemaug Rd.

Road 45. Thence generally northward on Catacunemaug Rd. until its junction with Robbs Hill Rd. in **Lunenburg.**

Road 46. Then generally northwesterly on Robbs Hill Rd. until its junction with Sunset Ln.

Road 47. Thence northward on Sunset Ln. until its junction with Flat Hill Rd.

Road 48. Thence northward on Flat Hill Rd. until its junction with Watt St.

Road 49. Thence westward on Watt St. until its junction with Page St.

Road 50. Thence westward on Page St. until its junction with Arbor St.

Road 51. Thence northward on Arbor St. until its junction with Rte. 2A/Massachusetts Ave.

Road 52. Thence westward on Rte. 2A/Massachusetts Ave. until its junction with Townsend Harbor Rd.

Road 53. Thence northward on Townsend Harbor Rd. until its junction with South Row Rd.

Road 54. Thence northwesterly on South Row Rd. until reaching the 100-foot wetlands Buffer Zone to the west of the wetlands which is to the north of South Row Rd.

100-ft Wetlands Buffer Zone 55. Thence northward crossing a stream south of Cove Rd. and following the western 100-foot wetlands Buffer Zone of these wetlands into **Townsend**, crossing another stream north of Cove Rd., continuing northward on the western 100-foot Buffer Zone, crossing another converging stream to the east of Gilchrist Rd., continuing northward on the 100-foot Buffer Zone until reaching the 200-foot Riverfront Area of the unnamed headwater segment of Witch Brook to the west of the wetlands.

200-ft Riverfront Area 56. Thence northwesterly along the 200-foot Riverfront Area south and west of this stream segment until reaching its junction with Emery Rd. near South Row Rd.

Road 57. Thence westward on Emery Rd. until reaching Tamarac Lane.

Road 58. Thence northeasterly on Tamarac Lane until reaching Apple Drive.

Road 59. Thence northwesterly on Apple Drive until reaching Cherry Drive.

Road 60. Thence southwesterly on Cherry Drive until reaching Emery Rd.

Road 61. Thence northwesterly on Emery Rd. until reaching Rte. 13.

Road	62. Thence northward on Rte. 13 until the junction with Worcester Rd.
Road	63. Thence westward and northward on Worcester Rd. until its junction with Rte. 119/Main St.
Road	64. Thence westward on Rte. 119 until reaching its junction with West Elm St.
Road	65. Thence southward on West Elm St. until reaching Linden St.
Road	66. Thence westward on Linden St. until reaching New Fitchburg Rd.
Road	67. Thence southward on New Fitchburg Rd. until reaching Wyman Rd.
Road	68. Thence eastward on Wyman Rd. which terminates shortly at Lunenburg Rd.
Road	69. Thence southward on West Elm St./Lunenburg Rd. which becomes West Townsend Rd. in **Lunenburg,** and continuing southward on West Townsend Rd. until its junction with Howard St.
Road	70. Thence westward on Howard St. until its junction with the town line of Fitchburg.
Town Line	71. Thence northward on the town line of **Fitchburg/Lunenburg** until the town line of Fitchburg/Ashby.
Town Line	72. Thence westward on the town line of **Fitchburg/Ashby** until reaching Wares Rd. in **Ashby**.
Road	73. Thence northward on Wares Rd. until its junction with Rte. 31/State Rd.
Road	74. Thence northward on Rte. 31/ State Rd. until reaching the southern property line of Willard Brook State Forest.
Public Property Line	75. Thence generally westward, northward, and eastward along the property line of Willard Brook State Forest until reaching Bernhardt Rd. (at Trap Falls Brook).
Road	76. Thence northward on Bernhardt Rd. until reaching Turnpike Rd.
Road	77. Thence westward on Turnpike Rd. until reaching Rte. 119/Main St.
Road	78. Thence westward on Rte. 119/Main St. until its junction with New Ipswich Rd.
Road	79. Thence northward on New Ipswich Rd. to Mason Rd.
Road	80. Thence northward on Mason Rd.. to its junction with Foster Rd.

Road 81. Thence eastward on Foster Rd. until its intersection with Bernhardt Rd.

Road 82. Thence eastward on Bernhardt Rd. to it's junction with Wheeler Rd.

Road 83. Thence northward on Wheeler Rd. until its junction with Rte. 31/Greenville Rd.

Road 84. Thence northward on Rte. 31/Greenville Rd. until the junction with Heywood Rd.

Road 85. Thence westward on Heywood Rd. until the junction with Mason Rd.

Road 86. Thence northward on Mason Rd. until the junction with Locke Rd.

Road 87. Thence eastward on Locke Rd. until its junction with Rte. 31/Greenville Rd.

Road 88. Thence northward on Rte. 31/Greenville Rd. until reaching the Massachusetts/New Hampshire state line, completing the external perimeter of the Squannassit ACEC.

Within the Squannassit ACEC boundary, the following areas are not included: Areas (1) – (9)

Area (1), Townsend

100-ft Wetlands Buffer Zone	1. Commencing at the northeasterly corner of Area (1), at the intersection of Highland St. in **Townsend** and the 100-foot wetlands Buffer Zone to the west of the wetlands lying to the west of the intermittent stream that runs in a north-south orientation in the vicinity of the intersection of Adams Rd. and Highland St., proceed southerly along the 100-foot wetlands Buffer Zone until reaching the northern boundary of Meetinghouse Park (demarcated on the Town Properties Map, Townsend, MA, and included in the MassGIS digital datalayer for Open Space).
Public Property Line	2. Thence westward and southward along the property line of Meetinghouse Park to the intersection with the 200-foot Riverfront Area to the west of the unnamed stream that runs in a north-south orientation between Meetinghouse Park and the Townsend State Forest to the south.
200-ft Riverfront Area	3. Thence southerly along the 200-foot Riverfront Area west of the stream, crossing Rte. 119, until reaching the northern edge of the Massachusetts Bay Transportation Authority (MBTA) railroad right-of-way.
Railroad Right-of-Way	4. Thence westward along the northern edge of the MBTA railroad right-of-way until reaching the 200-foot Riverfront Area east of the Squannacook River.
200-ft Riverfront Area	5. Thence northeasterly along the 200-foot Riverfront Area east of the Squannacook River until reaching Highland St.
Road	6. Thence eastward on Highland St. until its junction with School St.
Road	7. Thence northward on School St. until reaching Water St.
Road	8. Thence eastward on Water St. until its junction with Rte. 13/Brookline Rd.
Road	9. Thence northward on Rte. 13/Brookline Rd. just until the junction of Smith St.
Road	10. Thence eastward and southward on Smith St. until its junction with Highland St.
Road	11. Thence eastward on Highland St. until reaching its intersection with the 100-foot wetlands Buffer Zone west of the wetlands lying to the west of the intermittent stream near Adams Rd., completing the perimeter of Area (1).

Area (2),Townsend

200-ft Riverfront Area	1. Commencing at the southwestern corner of Area (2) at the junction of the 200-foot Riverfront Area east of the unnamed stream that runs south to the Squannacook River and the northern right-of-way of the railroad tracks in **Townsend** near Old Meetinghouse Rd., proceed northward along this 200-foot Riverfront Area east of the unnamed stream with north-south orientation in Meetinghouse Park until reaching the southern property line of Meetinghouse Park (demarcated on the Town Properties Map, Townsend, MA, and included in the MassGIS digital datalayer for Open Space).
Public Property Line	2. Thence generally eastward, northward, and westward in a counter-clockwise direction following the property line of Meetinghouse Park until reaching the 100-foot wetlands Buffer Zone to the east of the wetlands lying to the east of the intermittent stream near the intersection of Highland St. and Adams Rd.
100-ft Wetlands Buffer Zone	3. Then generally northward, eastward crossing a stream, and northwestward crossing two streams, in a counter-clockwise direction along the 100-foot wetlands Buffer Zone until reaching Highland St.
Road	4. Thence eastward on Highland St. until its junction with Wallace Hill Rd.
Road	5. Thence southward on Wallace Hill Rd. to its junction with Proctor Rd.
Road	6. Then continuing southeasterly on Proctor Rd. until reaching the 200-foot Riverfront Area west of the unnamed stream with northeast-southwest orientation that runs to the Squannacook River to the east of Spaulding St.
200-ft Riverfront Area	7. Thence southwesterly along the 200-foot Riverfront Area west of this unnamed stream until reaching Rte. 119.
Road	8. Thence westward along Rte. 119 to South St.
Road	9. Thence southward on South St. just until reaching the northern edge of the MBTA railroad right-of-way just south of Rte. 119.
Railroad Right-of-Way	10. Thence westward along the northern edge of the MBTA railroad right-of-way until reaching the 200-foot Riverfront Area to the east of the unnamed stream near Old Meetinghouse Rd., completing the perimeter of Area (2).

Area (3), Pepperell and Townsend

Road	1. Commencing at the northernmost point of Area (3), located at the junction of Chestnut St. and Bayberry Rd. in **Pepperell**, proceed southward on Bayberry Rd. until its junction with Heald St.

Road 2. Thence westward on Heald St. until its junction with West St.

Road 3. Thence southward on West St. until its junction with Harbor St.

Road 4. Thence eastward on Harbor St. until its junction with Hillside St.

Road 5. Thence southward on Hillside St. until its junction with Rte. 119.

Road 6. Thence westward on Rte. 119 until its junction with Edwards Rd. in **Townsend.**

Road 7. Thence northward on Edwards Rd. until its junction with Todd Drive.

Road 8. Thence northward on Todd Drive until reaching the 200-foot Riverfront Area east of the unnamed stream with northeast-southwest orientation (that runs to the Squannacook River to the east of Spaulding St.).

200-ft Riverfront Area 9. Thence northward along the 200-foot Riverfront Area east of this unnamed stream until reaching Hog Hill Rd.

Road 10. Thence westward on Hog Hill Rd. proceeding the short distance until reaching the junction of Haynes Rd.

Road 11. Thence northward on Haynes Rd/Locke Rd. to its intersection with Chestnut St.

Road 12. Thence northeasterly on Chestnut St. into **Pepperell** until reaching the junction with Bayberry Rd., completing the perimeter of Area (3).

Area (4), Pepperell

Road 1. Commencing at the south-westernmost point of Area (4), located at the junction of Heald St. and Maple St. in **Pepperell**, proceed northward on Maple St. and continue northward on Lawrence St. until reaching the 200-foot Riverfront Area south of the unnamed stream with east-west orientation that joins with Sucker Brook to the east.

200-ft Riverfront Area 2. Thence eastward along the 200-foot Riverfront Area south of this unnamed stream until its crossing with Boynton St.

Road 3. Thence southward on Boynton St. until its junction with Oak Hill St.

Road 4. Thence the short distance eastward on Oak Hill St. until its junction with Blood St.

Road 5. Thence southward on Blood St. until reaching the 200-foot Riverfront Area north of Sucker Brook at the unnamed pond (locally known as Burkenshaw

Pond).

200-ft Riverfront Area 6. Thence in a westerly and southerly direction, along the 200-foot Riverfront Area north and west of Sucker Brook (that includes Burkenshaw Pond) until reaching Heald St.

Road 7. Thence westward on Heald St. until reaching its junction with Maple St., completing the perimeter of Area (4).

Area (5), Townsend

Road 1. Commencing at the northwest corner of Area (5) at the junctions of South Row Rd., Old Meetinghouse Rd. and South Harbor Rd. in **Townsend** just south of Bixby Brook, proceed eastward on South Harbor Rd. until reaching Ash St.

Road 2. Thence southward on Ash St. until its junction with Walnut St.

Road 3. Thence follow Walnut St. northeasterly then southeasterly to Beech St.

Road 4. Thence southwesterly on Beech St. to Maplewood Dr.

Road 5. Thence generally southeasterly, southerly, and southwesterly on Maplewood Dr. to Ponderosa Dr.

Road 6. Thence generally southwesterly on Ponderosa Dr. until reaching Ash St.

Road 7. Thence southward on Ash St. until reaching the 200-foot Riverfront Area to the north of Witch Brook.

200-ft Riverfront Area 8. Thence southwesterly along the 200-foot Riverfront Area to the north of Witch Brook until meeting the 100-foot wetlands Buffer Zone of the wetlands surrounding a section of the Squannacook River Wildlife Management Area**.**

100-ft Wetlands Buffer Zone 9. Then following the 100-foot wetlands Buffer Zone as it leads generally northward and westward towards the 200-foot Riverfront Area of the unnamed headwater segment of Witch Brook to the west of those wetlands.

200-ft Riverfront Area 10. Thence in a northwestward course along the 200-foot Riverfront Area to the northeast of this stream segment, until reaching its crossing of South Row Rd.

Road 11. Thence northward on South Row Rd. until its junction with Old Meetinghouse Rd. and South Harbor Rd., completing the perimeter of Area (5).

Area (6), Townsend and Shirley

Road	1. Commencing at the southeasternmost point of Area (6), at the junction of Townsend Rd. and Spaulding Rd. in **Shirley**, proceed northwesterly on Spaulding Rd. into **Townsend**, where it becomes Turner Rd. and continue northwesterly to its junction with Pierce Rd.**.**
Road	2. Thence northwesterly on Pierce Rd. until reaching the 200-foot Riverfront Area east of Witch Brook.
200-ft Riverfront Area	3. Follow the 200-foot Riverfront Area of Witch Brook northeasterly, until its crossing with Warren Rd.
Road	4. Thence southward on Warren Rd. until its junction with Shirley Rd.
Road	5. Then southward on Shirley Rd to its intersection with the western border of the Squannacook River Wildlife Management Area (SRWMA).
Public Property Line	6. Follow the SRWMA property line southwesterly, southeasterly, and northeasterly to Shirley Rd.
Road	7. Continue southward on Shirley Rd. into **Shirley** where it becomes Townsend Rd. and continue southward until its intersection with Spaulding Rd., completing the perimeter of Area (6).

Area (7), Groton

Road	1. Commencing at the northwest corner of Area (7) at the junction of Townsend Rd. and Kemp St. (labeled Hill Rd. on the Ayer USGS topographical map) in West **Groton** proceed eastward on Kemp St. until its junction with Pepperell Rd.
Road	2. Thence southward on Pepperell Rd. until its junction with Townsend Rd. just north of Rte. 225.
Road	3. Thence northward on Townsend Rd. until its junction again with Kemp St., completing the perimeter of Area (7).

Area (8), Shirley

Road	1. Commencing at the southeastern corner of Area (8), at the junction of Lawton Rd. and Rte. 2A/Great Rd. in **Shirley,** proceed westward on Rte. 2A/Great Rd. until reaching the 200-foot Riverfront Area northeast of Mulpus

Brook.

200-ft Riverfront Area 2. Thence follow the 200-foot Riverfront Area north of Mulpus Brook in a northwesterly direction until its crossing with Townsend Rd.

Road 3. Thence northward on Townsend Rd. until reaching the 200-foot Riverfront Area south of Trap Swamp Brook.

200-ft Riverfront Area 4. Thence follow the 200-foot Riverfront Area south of Trap Swamp Brook northeasterly, until its crossing with Squannacook Rd.

Road 5. Thence southeasterly on Squannacook Rd. until its junction with Rte. 225/Groton Rd.

Road 6. Thence westward on Rte. 225/Groton Rd. until its junction with Lawton Rd.

Road 7. Thence southward on Lawton Rd. until reaching its junction with Rte. 2A/Great Rd., completing the perimeter of Area (8).

Area (9), Shirley

Road 1. Commencing at the northwestern corner of Area (9), at the junction of the eastern Riverfront Area of Beaver Pond Brook and Rte. 2A/Great Rd. in **Shirley**, proceed eastward on Rte. 2A/Great Rd. until reaching the western edge of the right-of-way of the power lines close to the junction of Rte.2A and Walker Rd.

Powerline 2. Thence southwesterly along the western edge of the right-of-way of the power lines until its crossing over Hazen Rd.

Road 3. Thence westward on Hazen Rd. until its junction with Clark Rd.

Road 4. Thence southward on Clark Rd. until its junction with Patterson Rd.

Road 5. Thence southeasterly on Patterson Rd. to the junction of Ayer Rd.

Road 6. Thence eastward on Ayer Rd. until its intersection with Front St.

Connecting Line 7. Then southward crossing Front St. to the boundary of the USF&WS Oxbow NWR property to the south of Front St.

Public Property Line 8. Thence southwesterly along the boundary of the USF&WS property until reaching the 200-foot Riverfront Area north of the intersection of the lower Catacoonamug Brook and the Nashua River.

200-ft Riverfront 9. Thence follow the 200-foot Riverfront Area to the north of Catacoonamug Brook westward to its intersection with the 100-foot wetlands Buffer Zone

Area	north of Phoenix Pond.
100-ft Wetlands Buffer Zone	10. Thence continuing westerly along the 100-foot wetlands Buffer Zone north of Phoenix Pond to the intersection with the 200-foot Riverfront Area to the north of Catacoonamug Brook.
200-ft Riverfront Area	11. Thence continuing northwesterly along the 200-foot Riverfront Area to the north of Catacoonamug Brook until the intersection with the eastern edge of the right-of-way of the power lines.
Powerline	12. Thence following the eastern edge of the right-of-way of the power lines northeasterly until the crossing with Center Rd.
Road	13. Thence northward on Center Rd. until its junction with Holden Rd.
Road	14. Thence northward on Holden Rd. until its junction with Whitney Rd.
Road	15. Thence westward on Whitney Rd. until reaching the 200-foot Riverfront Area to the east of Beaver Pond Brook.
200-ft Riverfront Area	16. Thence northward following the 200-foot Riverfront Area to the east of Beaver Pond Brook, until its crossing with Rte. 2A/Great Rd., completing the perimeter of Area (9).

IV. Summary of the Criteria for Designation

In the review process leading to the designation of a nominated area, the Secretary must consider the factors specified in 301 C.M.R. 12.09 of the ACEC Regulations regarding the designation of Areas of Critical Environmental Concern. As stated in the regulations, the factors need not be weighed equally, nor must all of these factors be present for an area to be designated. The strong presence of a single factor may be sufficient for designation.

Based on the information presented in the letter of nomination, at the public hearing, in written comments received throughout the public review process, and in agency research and review, I find the following factors relevant to the designated ACEC.

(1) Threat to the Public Health through Inappropriate Use

According to comments provided by state agency reviewers, there are highly significant drinking water resources present within the ACEC. These include portions of several high-yield aquifers as defined by the USGS in the areas of Pearl Hill-Willard Brook and Witch Brook in Townsend, Stewart Brook in Pepperell, the Squannacook and Nashua Rivers in Groton, Shirley and Ayer, and Grove Pond in Ayer. As stated above in section II. Summary Description of the Resources of the Squannassit ACEC, the area of these high-yield aquifers is 1,800 acres, or 5% of the ACEC. Extensive medium-yield aquifers are located along the length of the Squannacook River in Townsend, Groton, and Shirley, Sucker Brook and the Nissitissit River in Pepperell, and Morse and Catacoonamug Brooks in Shirley. The area of these medium-yield aquifers is 4,450 acres, or 12% of the ACEC.

There are eight municipal wells located within the ACEC, in Ayer, Groton, Pepperell, Shirley and Townsend, and two in Ayer the within the Devens Enterprise Zone (DEZ, located in Ayer, Harvard and Shirley). These ten wells currently produce approximately 1,057 million gallons of water annually, about 58% of the amount produced by all of the municipal systems in these towns and the DEZ. The Zone II and Interim Wellhead Protection Areas for these wells cover approximately 5,300 acres, or 14% of the ACEC. There are also other types of public water supplies located within the ACEC, in Ashby and Townsend, classified by the state DEP as non-transient, non-community (NTNC) or transient non-community (TNC). There are seven of these wells within the ACEC. The combined area of high- and medium-yield aquifers and the Zone II and Interim Wellhead Protection Areas for current water supply facilities totals approximately 9,380 acres, or 25% of the ACEC.

In addition, there are municipal and community water supply wells located just outside of the ACEC. Extensive areas throughout the ACEC are not served by public systems, and private wells for residences and businesses use groundwater for water supplies.

According to comments provided by Nashua Watershed Team Leader Jo Anne Carr,

> The local groundwater resources are the most practical water supply for all of the communities within the proposed ACECs. To date none of the supplies have been compromised due to poor water quality. In the future, however, surface and groundwater quality and quantity is expected to present a problem due to pressing demand with increased growth and development. Recent buildout analyses completed by the Executive Office of Environmental Affairs, Community Preservation Initiative projects water demand to exceed present safe yields of groundwater resources. The recently completed Hydrologic Analysis (Camp Dresser McKee, June 2002) completed for the Nashua Team indicates that Mulpus Brook is already under a medium level of flow stress, according to the Department of Environmental Management [Office of Water Resources] OWR definitions….
>
> The Squannacook and Nissitissit Rivers are very high quality systems, which are under intense development pressure and the threats that implies. It should be noted that these rivers are considered Outstanding Resource Waters for the fisheries, and that they were both designated under the Massachusetts Rivers Sanctuary Act of 1975….
>
> Both the Squannacook and Nissitissit Rivers are on DEP's "Alert Status". While achieving water quality standards for a Class B Cold Water Fishery and Outstanding Resource Waters, issues relating to increased development and subsequent loss of riparian cover and increase in impervious areas pose a serious threat to these watersheds. Increasing water withdrawals will impact streamflow and habitat and augment the impacts of increasing temperatures and bacterial contamination during wet weather events.

According to comments provided by DEM's Office of Water Resources,

> Public water supplies in the proposed ACEC service towns that are forecast to undergo high rates of population increase over the next 20 years. Pepperell's population is expected to increase from 11,142 (2000) to 13,975 (2020), or by 25% above the current population. Townsend's population is forecast to increase from 9,198 (2000) to 12,200 (2020) for an increase of 33% above the current population. Shirley's population is forecast to increase from 6,353 (2000) to 7,550 (2020), or an increase of 18% above the current population. Ayer's population is expected to increase from 7,287 (2000) to 9,956 (2020), an increase of 37% above the current population. Lunenburg's population is expected to increase from 9,400 (2000) to 11,750 (2020), which results in an increase of 25% over the current population. (Population forecasts are from CDM's Nashua River Study, 2002). In addition, the Devens redevelopment area lies immediately south of the Squannacook aquifer. Growth in these areas will undoubtedly place additional demands on the public water supplies and aquifers in the ACEC area.

> Each of the large municipal supply wells have associated wellhead protection areas at least in part within the proposed ACEC area; thus we anticipate there would be a threat to public health through inappropriate use.
>
> The ACEC area includes the entirety or portions of the following subbasins: Nashua River Mainstem 2, Catacunemaug, Nissitissit, Squannacook 1, Squannacook 2, Mulpus Brook (as defined by CDM in their Nashua River Watershed Study, 2002). Of these subbasins, only Mulpus Brook is designated as a medium stressed basin under current and future (2020) conditions. This indicates that water supply withdrawals have the potential to reduce streamflows, and proposed activities in the subbasin should be given a higher degree of scrutiny for impacts to water resources.
>
> In particular, the aquifers within the proposed Squannassit ACEC are significant regional resources. There appears to be a strong hydraulic connection between the aquifers and surface water features in the area; thus, it will be imperative to manage water resources in the future so that public water supplies do not deplete streamflow and cause undue impacts to aquatic habitat, particularly during the high-demand summer months.

I find that the water resources and public drinking water supplies of the ACEC are highly significant, and a significant threat to the public health exists through inappropriate uses.

(2) Quality of the Natural Characteristics

The high quality of the natural characteristics of the ACEC is described extensively in the Squannassit ACEC Nomination Report and in public comments received during the public review. These high quality resources range from the extensive surface water and wetlands systems of the major rivers and streams of the ACEC to the upland blocks of forested landscapes that cover much of the area.

Productive cold water fisheries are found in the Squannacook and Nissitissit Rivers and several tributary streams.

The extensive and diverse wildlife habitat includes 17,160 acres of "Core Habitat" and 12,380 acres of "Supporting Natural Landscape," a stunning 79% of the entire ACEC, as documented by the BioMap report published in 2001 by the state's Natural Heritage & Endangered Species Program (NHESP). According to the NHESP,

> The BioMap project delineated as Core Habitat those areas of the state which, if protected, would protect the most viable populations of rare plants and animals, the best examples of natural communities, and the breadth of biodiversity of the state. Twenty-three percent of the entire state was delineated as Core Habitat. In the Southern New England Coastal Plains and Hills ecoregion, which includes the proposed Squannassit ACEC, only 15% of the ecoregion is Core Habitat. About 45% of the proposed Squannassit ACEC is BioMap Core Habitat. This high percentage of Core Habitat relative to both the state as a whole and to the ecoregion indicates the very high biodiversity value of the proposed Squannassit ACEC.

Approximately 12,380 acres or 33% of the ACEC is Supporting Natural Landscape, which is defined by NHESP as large, minimally fragmented areas that safeguard the Core Habitat while also including habitat for the common species of Massachusetts.

Also according to the NHESP, the known documented records from the Natural Heritage database indicate that there are 23 state-listed rare species known to occur within the boundaries of the Squannassit ACEC, further reflecting the high quality of the natural characteristics of the ACEC.

Regarding the Squannacook and Nissitissit Rivers, the NHESP states that they are two of the few rivers across the state that support healthy populations of rare freshwater mussels. Six of the twelve native mussel species known from the state are state-listed as rare species. The Squannacook River has two of these six. The Nissitissit River supports an Endangered mussel that is found in only five rivers or streams statewide. Three species of rare dragonflies and damselflies are also found along these two rivers. NHESP states, "The presence of several species of rare mussels and dragonflies indicates exceptionally high water quality in these two rivers and their tributaries."

Rare species habitat and biodiversity are further described below under Uniqueness of the Area.

I find that this criteria alone - Quality of the Natural Characteristics - is sufficient for designation.

(3) Productivity

As described above in the Quality of the Natural Characteristics and below in the Uniqueness of the Area, the Squannassit resource area is rich in hosting a high diversity of wildlife. Preserving these unfragmented ecosystems is a key to preserving biodiversity and the productivity of native habitats in Massachusetts. The ACEC includes highly productive aquifers, used for important public water supplies. There are also productive farmlands and forestlands within the ACEC.

(4) Uniqueness of the Area

The uniqueness of the area, like the Quality of the Natural Characteristics described above, is sufficient to support ACEC designation. As stated above, there are 23 state-listed species known to occur within the ACEC. These include 7 Endangered species, 3 Threatened, and 13 listed as species of Special Concern. One of the Endangered plants is found on one of three sites statewide, the second largest population in the state. Another Endangered plant is one of seven current sites statewide, a large and healthy population, although several of the other populations around the state have not been relocated in recent years. There are only six sites statewide of an Endangered dragonfly occurring in the ACEC, and a Special Concern dragonfly represents one site of only five reported statewide. Rare species habitat covers approximately 6,012 acres of the ACEC, or 16%.

In addition to information provided about state-listed rare species habitat and biodiversity (BioMap Project), the NHESP also provided information regarding Rare Reptile and Amphibian Reserves (Herp Reserves) and Vernal Pools.

In regard to Rare Reptile and Amphibian Reserves (Herp Reserves), NHESP has provided strong data supporting designation (see the Habitat Resources section above). NHESP states,

> Freshwater rare reptiles and amphibians are particularly threatened state-wide by development, as the animals' movements from wintering to breeding to feeding sites during the year are easily blocked by roads and development. Turtles, especially, are exceptionally vulnerable to dying on roadways. Because of turtles' low rate of successful reproduction, even a low adult mortality rate of 1% a year can doom a population over the long term. The inclusion of one of only nine herp reserves within the proposed Squannassit ACEC is a strong argument for the biodiversity value of this area.

In regard to Vernal Pools, the NHESP has also provided evidence to support designation (see the Habitat Resources section above). NHESP states,

> The proposed Squannassit ACEC includes reported sites for six of these eight rare species [that use vernal pools]. The high density of vernal pools within the boundaries of the proposed ACEC is very likely a major factor in the presence of these six species.
>
> In fact, the proposed ACEC encompasses a considerably higher density of Potential Vernal Pools than the average across the state. The Natural Heritage Program recently mapped the locations of probable vernal pools through aerial photointerpretation and collated the locations into a GIS datalayer of Potential Vernal Pools (PVPs). While not all of these locations will turn out to be real, certifiable vernal pools when checked on the ground, a high percentage will be functioning vernal pools. State-wide there is an average density of 5.574 Potential Vernal Pools per 1000 acres. By contrast, in the proposed Squannassit ACEC, the average density of PVPs is 9.844 per 1000 acres, about 1.75 times the state average.
>
> Thus, because of the high numbers of vernal pools within the boundaries of the proposed ACEC, this area is particularly well-suited to supporting viable populations of rare vertebrates dependent on these uncommon habitats.

Finally, as stated above, as part of the statewide BioMap project, approximately 17,160 areas or 46% of the ACEC are designated Core Habitat, and 12,380 acres or 33% are Supporting Natural Landscape.

The NHESP summarizes its comments as follows,

> The unique biological value of the nominated Squannassit ACEC lies in its exceptional riverine corridors, its concentration of other wetland resources, especially vernal pools, and its wealth of state-listed rare species. With the accelerated pace of human development and sprawl in the northeastern part of the state in recent decades, the protection of such a rich area, through every means possible, becomes ever more needed. The designation of this area as an ACEC provides the opportunity for state and local agencies, officials, and citizens to educate themselves about the unique attributes of this area, to plan wisely for its sustainable development, and to protect its natural resources.

According to the Criteria for Designation listed in the ACEC Regulations, "Uniqueness" also applies to archaeological and historic, or cultural, features, which support designation.

In written comments regarding the nomination submitted by the Massachusetts Historical Commission (MHC), MHC states that the ACEC includes a wide range of significant historic and archaeological properties. Known archaeological sites within the area, associated with Native American settlement of the area, date back 3,000 years. The MHC's Inventory of the Historic and Archaeological Assets of the Commonwealth lists more than 350 properties within the Squannassit and Petapawag nominated areas, including historic districts or portions of historic districts in the Squannassit area. MHC states, "Surviving eighteenth and nineteenth century structures and landscapes have helped preserve the historic character of this area." MHC concludes that the ACECs contain significant historic and archaeological resources.

In addition, as stated in the Squannassit Nomination Report, the Nashua River corridor is located at the center of the Freedom's Way National Heritage Area, which highlights American history through its programs for Rediscovering the Native Landscape, Inventing the New England Landscape, and Shaping the Landscape of Democracy.

According to review comments provided by DEM archaeologist Thomas Mahlstedt, the wetlands, riverine floodplains, and interior wooded uplands attract, or did attract, virtually every form of wildlife known in the northeastern part of the United States. Paleo Indian hunters and gatherers may have

reached the Nashua River Drainage sometime between 12,000 to 9,500 years ago. Given the unique environmental characteristics and favorable site location criteria of the Squannassit and Petapawag regions, he suggests that the area contains exceptionally high archaeological potential, both for the numbers of sites yet to be discovered, as well as for sites that retain high archaeological integrity and research value – in other words, "the region is a veritable archaeological museum." He states that the archaeological resources within the nomination area are unique records of past human behavior, sometimes resulting from a single activity or event, and sometimes from hundreds and even thousands of years of repeated use. The potential survival of many intact and well-preserved archaeological sites within the nomination area makes it one of the most important areas for research about our heritage within the Commonwealth.

(5) Irreversibility and Magnitude of Impact

Preserving and providing for the stewardship of the unique and high quality resource features of this ACEC is a daunting challenge in the face of growing development pressures in this part of the Commonwealth, which is located just outside of I-495 and north of Route 2. Based on previous experience in other parts of the Northeast, adverse impacts to public water supplies, surface water quality, rare species habitat, and biodiversity that are probable with intensive development would be irreversible. ACEC designation provides a framework for intermunicipal, intergovernmental, and community-regional interaction that can encourage and enable stewardship of these resources, balancing economic and environmental needs.

(6) Imminence of Threat to the Resource

As stated above, especially regarding future population growth estimates for the region (see DEM OWR comments under Threat to the Public Health through Inappropriate Use), this area is facing strong and unrelenting growth and development pressures. I find that these pressures are an imminent threat to the resources, character and quality of life of these communities and the region.

(7) Economic Benefits

The intrinsic natural, cultural and historic values of the area, and the wise preservation and management of these resources, will help support the quality of life of the ACEC communities, and thus provide indirect long-term economic benefits to the towns. The amount of farmland within the ACEC is relatively small, compared to other areas of the state, but from an ACEC stewardship perspective, it is an important element of the overall resource framework. According to the Department of Food and Agriculture (DFA), the ACEC includes portions of an Agricultural Preservation Restriction (APR) focus area, with commercially active farming areas to help support farm related businesses and local supermarkets. The inclusion of the Nashua River Watershed and the Squannassit ACEC as a Forest Legacy Area, one of six such areas in the Commonwealth, underscores the importance of long-term economic benefits through sound forest resource management and stewardship. The economic benefits to areas that provide passive recreation and ecotourism opportunities are well-known in other regions of the state, and are likely to become more important in this region. Furthermore, the protection and preservation of surface water quality and the aquifers located within the ACEC that provide current public water supplies, as well as potential future supplies, will yield long-term economic benefits.

(8) Supporting Factors

The public review process for the Squannassit nomination demonstrated very strong support for ACEC

designation. There is strong public consensus and awareness regarding the intrinsic value of the area and its importance. The Massachusetts Rivers Sanctuary Act of 1975, and the designation of the Squannacook and Nissitissit Rivers as Outstanding Resource Waters is an indication of the significance of the area. The pioneering and continued landmark activities and programs of the Nashua River Watershed Association, and the strong conservation ethic of the communities of the ACEC, provide hope and inspiration for further public education and environmental resource stewardship for the ACEC.

Summary of Comments

Approximately 250 comments plus a petition with 42 signatures were received in the course of the public participation process for the Squannassit and Petapawag ACEC nominations. Overall, approximately 200 comments supported ACEC designation and 35 opposed designation (others did not indicate a position), and a petition with 42 signatures opposed designation. Comments addressed either or both of the nominations. Approximately 30 letters of support for the nomination(s) were submitted from town boards, committees and commissions from the nine towns located within the Squannassit ACEC, as follows: Ashby Board of Selectmen, Planning Board, and Conservation Commission; Ayer Historical Commission; Groton Board of Selectmen, Planning Board, Conservation Commission, Greenway Committee, Historic Districts Committee, and Trails Committee; Harvard Board of Selectmen, Planning Board, and Conservation Commission; Lancaster Board of Selectmen, Planning Board, and Conservation Commission; Lunenburg Planning Board and Conservation Commission; Pepperell Planning Board, Conservation Commission, and Board of Health; Shirley Conservation Commission and Greenway Committee; and the Townsend Board of Selectmen, Planning Board, Conservation Commission, Board of Health, Master Plan Committee, Strategic Planning Committee, and the Zoning Board of Appeals. There were no letters from town boards, commissions or committees opposing designation. The Devens Enterprise Commission and MassDevelopment/Devens requested that the North Post area of the Devens Enterprise Zone be excluded from the ACEC.

State legislators representing towns within the ACEC who wrote letters of support included Senators Robert A. Antonioni, Steven C. Pangiotakis and Pamela P. Resor and Representatives Geoffrey D. Hall, Brian Knuuttila, and Patricia A. Walrath. Several federal or state agencies provided formal or informal comments and information, including the United States Fish and Wildlife Service; the state Department of Environmental Protection; the state Division of Fisheries and Wildlife (DFW) and the DFW Natural Heritage & Endangered Species Program; the state Department of Environmental Management Division of Forests and Parks, Division of Resource Conservation Office of Water Resources, Office of Natural Resources, and Office of Historic Resources; the state Department of Food and Agriculture; the Massachusetts Watershed Initiative of the Executive Office of Environmental Affairs; the Massachusetts Historical Commission; and the Massachusetts Highway Department.

Letters of support were submitted from several organizations, including the Ashby Land Trust, Freedom's Way Heritage Association, Friends of the Oxbow, Groton Conservation Trust, Lancaster Land Trust, Lunenburg Land Trust, Massachusetts Audubon Society, Massachusetts Watershed Coalition, Massapoag Rod & Gun Club, Merrimack River Watershed Council, Nashua River Watershed Association, Nashoba Conservation Trust, New England Forestry Foundation, North County Land Trust, PACE (People of Ayer Concerned about the Environment), Townsend Land Trust, The Trustees of Reservations, and Trout Unlimited Squan-A-Tissit Chapter.

Approximately 135 people attended the September 24, 2002 public hearing held in Townsend. Oral testimony included 46 comments supporting ACEC designation, and three comments opposing ACEC designation. Additional written comments were submitted.

Additional Factors Supporting Designation

A large amount of the area – approximately 14,270 acres, or 38% - is currently owned by the federal, state and local governments for conservation and recreation purposes, which is also a supporting factor for designation. Given the current amount of protected open space, wetlands and surface waters, open farmland and forest lands under Chapter 61 programs, and other undeveloped private lands, there is an opportunity to sustain the ecological viability, natural characteristics and unique qualities of this ACEC. I find this a goal of immense value to the Nashua River watershed, and future generations of these towns and of the region.

I strongly encourage the formation of a Squannassit ACEC stewardship group, in conjunction with the formation of a stewardship group for the Petapawag ACEC. The Squannassit ACEC includes nine towns, and the Petapawag ACEC includes three of these towns (Ayer, Groton and Pepperell) plus two more (Dunstable and Tyngsboro). Both ACECs share the Nashua River corridor and its associated resources. There a strong need for regional coordination and cooperation to meet the stated goals of the nomination and of the ACEC Program. The nomination document describes important stewardship goals and objectives for the area. These goals and objectives underscore the importance of coordination between the communities, and between all levels of government, community and environmental organizations, and residents. The ACEC designation can provide a framework and encourage this coordination and positive stewardship, and ACEC Program staff can provide technical assistance to an ACEC stewardship committee.

In addition, the Squannassit ACEC can provide a regional planning framework for environmental resource and open space preservation and management to take advantage of the goals, technical assistance and outreach of the Executive Office of Environmental Affairs' Watershed Initiative, Community Preservation Initiative, Biodiversity Initiative and other programs and assistance offered by environmental and other state agencies.

In summary, I find that virtually all of the criteria listed in the ACEC regulations support designation of the Squannassit ACEC. The quality and uniqueness of the resources of the area, especially riverine corridors, upland blocks of land connected by these corridors, high- and medium-yield aquifers, and outstanding biodiversity resources, in addition to other factors described above, are clearly sufficient for ACEC designation.

Conclusion

Therefore, for the reasons described in this document, I hereby exercise the authority granted to me pursuant to Mass. Gen. L. ch. 21A, § 2(7), to designate the Squannassit Area of Critical Environmental Concern. The significance of this ACEC requires that the highest standards of environmental review and protection be applied to actions that may affect its resources.

(Signed) Bob Durand December 11, 2002

Secretary of Environmental Affairs

[Original ACEC boundary description clarified to incorporate more accurate text, and entire document reformatted for ACEC Program website and public distribution, November, 2003.]