

10 Appendices

10.1 Appendix I: 2004 MWRA / DCR MOU

This Memorandum of Understanding (“MOU”) sets forth the agreement between the Commonwealth of Massachusetts Department of Conservation and Recreation (“DCR”) and the Massachusetts Water Resources Authority (“MWRA”) concerning the coordination and implementation of their respective responsibilities established by statute, administrative and court action, and by agreement in regard to the protection, construction, operation, maintenance and improvement of water supply resources, facilities, and infrastructure within the watershed and waterworks systems

See <http://www.mass.gov/dcr/waterSupply/watershed/documents/2004dcrmwraMOU.pdf> for the complete, 31 page text of this MOU.

10.2 Appendix II: Legislation

10.2.1 Acts of 1972 Chapter 737 (the Kelley-Wetmore Act)

Chapter 737: An act providing for the conservation and regulation of certain lands under the control of the Metropolitan District Commission.

Be it enacted as follows:

SECTION 1. In this act, the following words and phrases, unless otherwise expressly provided or the context otherwise provides, shall have the following meanings:

“Commission”, the metropolitan district commission.

“Commissioner”, the commissioner of the metropolitan district commission

“Ware river watershed”, those parcels of land under the control of the commission and being situated wholly or partly in the towns of Rutland, Oakham, Barre, Hubbardston, Templeton and Princeton and being shown on plan of land entitled “Ware River Watershed, General Plan”, dated November 22, 1965, Metropolitan District Commission, Commonwealth of Massachusetts, filed in the office of the commission.

“Quabbin reservoir area”, those parcels of land including the Prescott Peninsula, so-called, contiguous to the reservoir under the control of the commission and presently lying within the bounds of Routes 9, 32, 32A, 122 and 202 and being situated wholly or partly in the towns of Pelham, Belchertown, Ware, Hardwick, Petersham, New Salem and Shutesbury, and being shown on plan of land entitled “General Plan of Quabbin Reservoir Watershed, dated February 18, 1959, Metropolitan District Commission, Water Division, Quabbin Section, Commonwealth of Massachusetts”, filed in the office of the commission.

“District”, the combined lands identified in this act as the Ware river watershed and the Quabbin reservoir area, which are a portion of the total lands comprising the Quabbin section of the metropolitan water district.

SECTION 2. The natural ecology of the district shall be maintained, and it shall be conserved in its present degree of wilderness character and shall be protected in its flora and fauna in all reasonable ways to assure the balanced wildlife habitat and to allow camping with the approval of the district superintendent and in areas subject to his approval. Except as otherwise specifically authorized herein, no act or practice shall be undertaken which will adversely affect the balance of nature in the district. The commission shall

make and promulgate such rules and regulations regarding the uses authorized herein as are reasonably necessary to conserve the wilderness, watershed and reservoir character of the district.

SECTION 3. No lands or real property which are a part of the district shall be leased or sold or otherwise transferred without approval of the general court, nor shall there be any new or additional construction on said lands or real property except by the commission consistent with the purposes of this act.

SECTION 4. No new or additional roads or ways shall be constructed within the district, excepting only such ways as shall be required for forest management and fire control, or for watershed and reservoir purposes, nor shall existing soft surface roads or ways be hard surfaced, provided, however, that existing ways may be maintained and kept passable and in repair.

SECTION 5. The commission shall not permit the dumping of refuse or waste within the district except where such is allowed by permit granted by the commission prior to the effective date of this act for as long as such permit remains in effect, except, however, the commission may dispose of such refuse or waste resulting from normal operation of the district.

SECTION 6. No person shall take or remove and no town within the district shall authorize the taking or removal of sand, gravel, dirt or soil, nor any other mineral, from or within the district, except only that the commission may take such of these materials as are required for commission use within the district and may allow such use of these materials as may be required pursuant to section five.

SECTION 7. The commissioner, or his designee, shall annually prepare a plan detailing forestry activities, logging or lumbering activities, proposed plantings and the like which are to be undertaken for the next following year, which plan shall be open to inspection by the public.

SECTION 8. Lumbering or logging operations shall be permitted within the district to the extent and for the purpose of maintaining and conserving its forests in a healthful state of natural ecological balance consistent with reservoir and watershed purposes, but such lumbering and logging operations shall not be of a tree farming nature, so called, wherein natural diversification of tree species is upset nor wherein wildlife habitat or food chain growth is adversely affected. All lumbering or logging operations shall be performed under private contract pursuant to the bidding laws of the commonwealth the proceeds of which shall be used in whole or in part for the further management of the selfsame forests, excepting only for such emergency salvage operations as are deemed necessary by the forester, and with the further exception that the commission may take such lumber as is needed for its own use consistent with this act. All such lumber or logging operations shall be supervised by the forester who shall designate cuttings and shall make and enforce such rules as are necessary regarding disposal of slash and topplings, construction of logging ways or ramps, or the like, to conserve said forests within the intent of this act. No tree shall be felled or cut within one hundred feet of any river or stream or flow line of reservoir or pond with the district which change the character of stream beds, except for such emergency or salvage cuttings as aforesaid.

SECTION 9. The public shall have access to the lands of the district for such recreational uses as are permitted by, and are consistent with the provisions of this act, except that the Prescott peninsula shall be set aside as a natural site for ecological and wildlife study and access thereto shall be regulated by the commission.

SECTION 10. Hunting shall not be allowed in the Quabbin reservoir area [NOTE: amended by Chapter 436 of the Acts of 1990 to allow hunting in accordance with a deer management program.], however hunting may be permitted within the Ware river watershed subject to the rules and regulations of the commission and the division of fisheries and game regulating hunting.

SECTION 11. Powered boats or powered canoes shall not be used anywhere within that portion of the Ware river lying within the present bounds of Routes 68, 62, 122, 122A and 56, nor shall all-terrain or amphibious vehicles be operated in, on or through the streams, ponds or other waters within these same bounds except for official use.

SECTION 12. There shall be no overnight camping within the Quabbin reservoir area nor within that portion of the Ware River Watershed defined in the first sentence of section eleven of this act, nor shall tents be erected nor trailers or vehicular sleeping accommodations be parked overnight therein.

SECTION 13. Motor vehicles, snowmobiles and other recreation al vehicles may be operated within the Ware River Watershed only upon established vehicular ways and trails, or in such other areas as shall be designated by the commission. Public entry to the Quabbin reservoir area shall be limited to foot passage only, except that motor vehicles and manually operated bicycles may be admitted to such roads and ways within the Quabbin reservoir area as shall be designated by the commission. There shall be no racing of motor driven vehicles within the district, nor shall any associated rallies or commercial ventures be held therein. Snow vehicles or all-terrain vehicles shall be permitted within the Quabbin reservoir area only for official use.

SECTION 14. Notwithstanding any other provision of this act the establishment, construction and operation by the University of Massachusetts, hereinafter referred to as the university, of an astronomical observatory may be continued in compliance with and pursuant to the permit granted November twenty-sixth, nineteen hundred and sixty-nine by the commission, to the university, provided that access to the site of the said astronomical observatory shall be limited to such access road as may be specifically designated by the commission for the purpose, and provided further that no person or equipment, other than construction, maintenance and repair personnel and equipment, operating personnel and equipment and such students in the field of astronomy as may be authorized by the university for the purpose, shall be entitled to be admitted to the aforesaid site except in accordance with and under the provisions of this act. Any such person so admitted shall be subject to supervision while on the site by an officer or official of the university designated for said purpose. Similarly, the construction, maintenance and operation of the United States Air Force antenna installations in compliance with and pursuant to the permit granted November twenty-sixth, nineteen hundred and sixty-nine may be continued under the agreements pertaining thereto.

SECTION 15. The provisions of this act and of all rules and regulations made under the authority thereof shall be enforced by the commissioner, his duly appointed agents, by metropolitan district commission police officers, by police officers of any city or town, by members of the state police and by enforcement officers of the department of natural resources.

10.2.2 350 CMR 11.00 Watershed Protection Regulations

Official Disclaimer: These regulations are provided to you for your convenience. Official versions of all Massachusetts State statutes are available through the [State Bookstore](#). When downloading from the web please be aware that the copy you receive may differ from the official version. If you need the statutes for work that may have any legal implications, make sure to get the official version from the State bookstore.

Department of Conservation and Recreation; with corrections, May, 1994

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11.01 Introduction and Purpose

(1) Introduction - 350 CMR 11.00 is promulgated by the Commissioners of the Department of Conservation and Recreation pursuant to the authority granted under St. 1992 c. 36. St. 1992 c. 36, § 2 amends M.G.L. c. 92, § 104 by adding certain definitions which are used in 350 CMR 11.03; St. 1992 c. 36, § 3 adds M.G.L. c. 92, § 107A defining the jurisdiction and exemptions contained in 350 CMR 11.04 and 350 CMR 11.05, respectively; and St. 1992 c. 36, § 4 amends M.G.L. c. 92, § 108 by requiring the Division of Watershed Management, after consultation with the Department of Environmental Protection, to make rules and regulations for the protection of Watersheds as defined in St. 1992 c. 36.

In addition, St. 1992 c. 36 and M.G.L. c. 92 authorize the Department of Conservation and Recreation and the Division of Watershed Management to make rules and regulations to protect the Watersheds as

defined in St. 1992 c. 36 and the Watershed System as defined in St. 1992 c. 36 and M.G.L. c. 92. The Department of Environmental Protection is also required under St. 1992 c. 36, § 14 to adopt rules and regulations for the prevention of pollution and securing the sanitary protection of all waters used as sources of water supply in the Commonwealth other than in the Watersheds as defined in St. 1992 c. 36. Regulations currently exist for:

- (a) the sanitary protection of waters used by the Department of Conservation and Recreation (310 CMR 23.00);
- (b) land within Watershed Reservations (350 CMR 8.00);
- (c) sanitary rules and regulations for the Metropolitan Water Supply (350 CMR 9.00); and
- (d) fishing in Wachusett and Sudbury Reservoirs (350 CMR 10.00).

In order to facilitate review of all regulations promulgated by the Department of Conservation and Recreation and the Division of Watershed Management relating to Watersheds and the Watershed System, 350 CMR 11.09 includes regulations of general applicability to Waters of the Watershed System. The regulations in 350 CMR 11.09 are intended to supersede the regulations in 310 CMR 23.00, 350 CMR 8.01, 350 CMR 9.00, and 350 CMR 10.00, which shall be repealed on March 31, 1994.

(2) Purpose - The purpose of St. 1992 c. 36 is to improve the protection of the metropolitan water supply. St. 1992 c. 36 and 350 CMR 11.00 set forth a comprehensive scheme to regulate land use and activities within certain critical areas of the Watersheds and Watershed System.

The purpose of 350 CMR 11.00 is to define and clarify the restrictions and prohibitions set forth in St. 1992 c. 36 by establishing standard definitions and procedures under which the Division of Watershed Management may carry out its responsibilities under St. 1992 c. 36. 350 CMR 11.00 shall complement St. 1992 c. 36 and shall have the force of law on March 31, 1994.

11.02: General Provisions

(1) Time Periods. Unless otherwise specifically provided in St. 1992 c. 36 or 350 CMR 11.00, computation of any time period referred to in 350 CMR 11.00 shall begin with the first day following the action which initiates the running of the time period. The last day of the time period so computed is to be included unless it is a Saturday, Sunday or legal holiday or any other day on which the office of the Division is closed, in which event the period shall run until the end of the next following business day. When the time period is less than seven days, intervening days when the Division is closed shall be excluded in the computation.

(2) Timely Filing. All Papers must be filed at the Division office or such other place as the Division shall specify in 350 CMR 11.00 within the time limits set forth herein.

Unless otherwise specifically provided in St. 1992 c. 36 or 350 CMR 11.00, Papers filed in the following manner shall be deemed to be filed as set forth herein:

- (a) *Hand delivery during business hours*. By hand delivery during business hours shall be deemed filed on the day delivered.
- (b) *Hand delivery during non-business hours*. By hand delivery at times other than during regular business hours shall be deemed filed on the next regular business day.

(c) *Mailing*. By placing in the United States Mail certified or registered mail, return receipt requested shall be deemed filed on the date received by the Division.

All Papers shall show the date received by the Division and the Division shall cooperate in giving date receipts to Persons filing Papers by hand delivery.

(3) *Actions by the Division*. Where St. 1992 c. 36 states that a particular action (except receipt of a request or notice) is to be taken by the Division, that action is to be taken by the person designated by 350 CMR 11.00 or, if by a committee, by more than half the members present at a meeting of at least a quorum. A quorum is defined as a Majority of the members then in office.

(4) *Burden of Proof*. Any Person who files a request for Advisory Ruling, a request for Watershed determination of applicability, an application for variance or a request for Exemption of a Tributary shall have the burden of producing credible evidence from a competent source in order to demonstrate to the Division or, in the case of an appeal, to the Commission, support for the position taken or the relief requested.

(5) *Capitalized Terms*. Any capitalized terms used in 350 CMR 11.00 shall have the meanings ascribed to such terms in 350 CMR 11.03.

11.03 Definitions

Advisory Ruling means a ruling issued by the Division pursuant to 350 CMR 11.06(1).

Agriculture, Land in Agricultural Use and Normal Maintenance or Improvement of Land in Agricultural Use shall have the meanings ascribed to such terms in 310 CMR 10.04.

Alteration means:

- (a) draining, dumping, dredging, damming, discharging, excavating, filling or grading;
- (b) the erection, reconstruction or substantial expansion of any buildings or Structures;
- (c) the driving of pilings;
- (d) the construction or reconstruction or paving of roads and other ways;
- (e) the construction or reconstruction of utilities;
- (f) the changing of run-off characteristics;
- (g) the intercepting or diverting of ground waters, surface waters, reservoirs, tributaries, or aquifers; and
- (h) the installation or substantial expansion of drainage, sewage and water systems.

Applicability Decision means the written decision issued by the Division pursuant to 350 CMR 11.06(2)(e).

Aquifer means a geological formation, group of formations, or part of a formation in the Wachusett Watershed that is capable of yielding a significant amount of water to a well or spring, as determined by reference to the Maps, 350 CMR 11.07. The land directly overlaying an aquifer shall be deemed to be part of said aquifer.

Authority means the Massachusetts Water Resources Authority.

Bank means the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a Bordering Vegetated Wetland and adjacent Flood plain, or in the absence of these, it occurs between a water body and an upland. A bank may be partially or totally vegetated or may be comprised of exposed soil, gravel or stone. The upper boundary of a bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a bank is the mean annual low flow level.

Bordering Vegetated Wetland means a wet meadow, except meadows used for the grazing of livestock, marsh, swamp, bog or other area, hydrologically connected to and bordering on a Tributary, Reservoir, Flood plain, or Surface Water, which supports at least 50% wetland species and as defined in the Wetlands Protection Act as defined herein.

Commission means the Department of Conservation and Recreation.

Commonwealth means the Commonwealth of Massachusetts.

Date of Issuance means the date a determination, order or decision is hand delivered or mailed as provided in 350 CMR 11.00.

Date of Submission means the date the Division assigns a file number to a request or application submitted pursuant to 350 CMR 11.06. Assignment of a file number shall not imply that a request, application or supporting documents have been determined adequate to support the relief requested, but only that the submission is complete in accordance with the requirements of 350 CMR 11.06.

Department means the Department of Environmental Protection of the Commonwealth of Massachusetts.

Discharge or Discharge of Pollutant means any addition of Pollutants or combination of Pollutants from any source including, but not limited to, discharges from surface runoff, which are collected or channelled by man and through pipes, sewers or other conveyances.

Disposal means the discharge, deposit, injection, dumping, spilling, leaking, incineration or placing into or on any land or water so that the matter disposed of may enter the environment or be emitted into the air or discharged into any waters, including Ground water.

Division means the Division of Watershed Management of the Commission.

Dwelling means any structure or building, or any portion thereof which is used, intended to be used, or designed to be occupied for human habitation purposes, including, but not limited to, houses, hotels, motels, apartments and condominiums.

Exemption Decision means a decision of the Division, in consultation with the Department, to exempt a Tributary from regulation under St. 1992 c. 36 issued pursuant to 350 CMR 11.06(4)(g).

Flood plain means the land adjoining a Tributary, Reservoir or Surface Water, which is subject to inundation from a flood having a 1% chance of being equaled or exceeded in any given year, commonly known as the 100 year flood plain, as determined by reference to the Maps, 350 CMR 11.07.

Generate or Generation of Pollutants means the origination, creation or production of Pollutants.

Ground water means water below the land surface in a saturated zone, including perched ground water.

Hazardous Material or Waste means any material or waste, in whatever form, which because of its quantity, concentration, corrosivity, flammability, reactivity, toxicity, or infectious, chemical or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare, or to the environment. Hazardous Material or Waste shall include those materials listed in 40 CFR 261, or 310 CMR 40.900 Appendix I.

Impervious means not allowing entrance or passage of water due to the presence on or above the ground of material having a percolation rate of greater than 30 minutes per inch, including, but not limited to, pavement, concrete, stone, peat, loam and other organic matter.

Leaching Field means a soil absorption system as such term is defined in Title 5 (350 CMR 15.00).

List of Affected Parcels means the list developed by the Division from maps prepared pursuant to M.G.L. c. 92 § 107A(q).

Lot means an area of land subject to St. 1992 c. 36 in one ownership with definite boundaries described in a deed or shown on a plan recorded in the registry of deeds or registered in the registry district of the land court.

Maps means the maps described in 350 CMR 11.07.

Majority means more than half of the members of any body making a decision pursuant to 350 CMR 11.00.

Natural Basin means an area bounded peripherally by a water parting and draining ultimately to a particular water course or body of water; the catchment area or drainage basin from within which the waters of a stream or stream system are drawn.

Owning an Interest in Real Property or Real Property Interest means having alone, or jointly or severally with others:

- (a) legal title to real property;
- (b) the care, charge or control of real property in any capacity including, but not limited to as agent, executor, executrix, administrator, administratrix, trustee, or guardian of the estate of the holder of legal title;
- (c) lessee under a written lease; or
- (d) an agent, trustee or other person appointed by the Courts of the Commonwealth.

Papers means all requests, documents, papers, notices, appeals and other written communications permitted or required by the regulations to be filed with the Division or the Commission.

Party Aggrieved means any Person who, because of an act or failure to act by the Division or the Commission under St. 1992 c. 36 or 350 CMR 11.00, may suffer an injury in fact which is different, either in kind or magnitude, from that suffered by the general public, and which is within the scope of the interests identified in St. 1992 c. 36. Such party must specify, in writing, sufficient facts to allow the Division or the Commission to determine whether or not the party is, in fact, aggrieved.

Person means an individual, partnership, corporation, firm, association or group, including a city, town, county, the Commonwealth or other governmental unit owning property or carrying on an activity regulated by St. 1992 c. 36.

Plans means such data, maps, engineering drawings, calculations, specifications, schedules and other materials, if any, deemed necessary by the Division to describe the Lot, portion of the Lot or the Alteration to determine the applicability of St. 1992 c. 36 or to determine the impact of the Alteration upon the interests identified in St. 1992 c. 36.

Pollutant means any substance, man-made or resulting from human activities, that can alter the biological, chemical, physical, or radiological character of water.

Reservoir means either the Wachusett or the Quabbin Reservoir.

Sewage Treatment Facility means any wastewater treatment facility used for treating, neutralizing or stabilizing sewage, including: treatment or disposal plants; the necessary intercepting outfall and outlet sewers; pumping stations integral to such facilities; and equipment and appurtenances related to the foregoing.

Sewer System means pipelines or conduits, pumping stations, force mains, and all other structures, devices, appurtenances, and facilities used for collecting and conveying wastes to a site or works for treatment or disposal.

Storage means the actual or intended containment on a temporary basis or permanent basis which does not constitute Disposal.

Structure means a combination of materials assembled at a fixed location to give support or shelter, such as, but not limited to, a Dwelling, a building, framework, retaining wall, tent, reviewing stand, platform, bin, fence over six feet high, sign, flagpole, recreational tramway, mast for radio antenna or the like. The word "structure" shall be construed, where the context requires, as though followed by the words "or part or parts thereof."

Subsurface Waste Water Disposal System means an on-site subsurface sewage disposal system as defined in Title 5 (310 CMR 15.00).

Surface Water(s) means water in the Watersheds, including any lake, spring, impoundment, and pond, as determined by reference to the Maps, 350 CMR 11.07. Surface water shall include the land located thereunder and the Banks thereto. Surface water shall exclude all Reservoirs, Tributaries, Aquifers, Ground waters, and man-made farm ponds used for irrigation, as well as so-called great ponds of the Commonwealth which do not drain into a Tributary or a Reservoir.

Title 5 means Title 5 of the Massachusetts Environmental Code governing standard requirements for the siting, constructing, repair, replacement and maintenance of on-site sewage treatment and disposal systems, 310 CMR 15.00.

Treatment means any method, technique, or process, including neutralization, incineration, stabilization or solidification, designed to change the physical, chemical or biological character or composition of any Hazardous Material or Waste so as to neutralize such Material or Waste or so as to render such Material or Waste less hazardous, non-hazardous, safer to transport, amenable to storage, or reduced in volume, except such method or technique as may be included as an integral part of a manufacturing process at the point of generation.

Tributary means a body of running water, including a river, stream, brook and creek, which moves in a definite channel in the ground due to a hydraulic gradient and which flows ultimately into a Reservoir in the Watersheds or the Ware River above the Ware River intake, as determined by reference to the Maps, 350 CMR 11.07. A Tributary shall include the land over which the water therein runs and the Banks thereto.

Uses and Activities means those uses and activities described in M.G.L. c. 92, § 107A(a) and (b)(2) and 350 CMR 11.04(3).

Variance Decision means the written decision issued by the Division pursuant to 350 CMR 11.06(3)(g).

Waters of the Watershed System means all waters that in their natural course would flow into the Ware River above the Colbrook Diversion, the open channel of the Wachusett Aqueduct, the Quabbin, Wachusett, Sudbury and Foss reservoirs and any other lake, pond, reservoir, aqueduct, stream, ditch, watercourse or any other open water under the provision of M.G.L. c. 92, § 109.

Watershed Reservation(s) means land within the Watershed System and described in St. 1972 c. 737 as amended by St. 1990 c. 436.

Watershed(s) means the Natural Basin from within which water drains or in the natural course would drain into the Quabbin Reservoir, the Wachusett Reservoir, or the Ware River upstream of the Ware River intake.

Watershed System means:

(a) all real and personal property interests held by or on behalf of the Commonwealth immediately prior to the effective date of St. 1992 c. 36 in and for the Department of Conservation and Recreation water system which were part of or appurtenant to the Quabbin Watershed, Quabbin Reservoir, Ware River Watershed, Wachusett Watershed, Wachusett Reservoir, North and South Sudbury watersheds, Sudbury Reservoir, Framingham Reservoirs 1, 2 and 3, Blue Hills Reservoir, Bear Hill Reservoir, Spot Pond Reservoir, Fells Reservoir, Weston Reservoir, Norumbega Reservoir, Chestnut Hill Reservoir, including land, easements, buildings, Structures, all equipment, machinery, vehicles and appliances, improvements, water rights and rights in source of water supply; and

(b) all enlargements and additions to the former Department of Conservation and Recreation water system acquired or constructed by the Division for the purpose of the Watershed System, including land, easements, buildings, Structures, equipment, machinery, vehicles, and appliances, improvements, reservoirs, dams, water rights and rights in sources of water supply, but excluding the Waterworks System of the Authority.

Waterworks System means waterworks system as defined in M.G.L. c. 92 App. and 360 CMR 10.00 et seq.

Wetlands Protection Act means the Wetlands Protection Act, M.G.L. c. 131, § 40 and regulations promulgated pursuant thereto, 310 CMR 10.00 et seq.

11.04: Jurisdiction

(1) Areas Regulated. Areas regulated by St. 1992 c. 36 and 350 CMR 11.00 include those portions of the Watersheds which lie:

- (a) within 400 feet of the Bank of a Reservoir;
- (b) within 200 feet of the Bank of a Tributary or Surface Waters;
- (c) within the area between 200 and 400 feet of the Bank of a Tributary or Surface Waters;

(d) within the Flood plain of a Tributary or Surface Waters, including that flood plain;

(e) within Bordering Vegetated Wetlands that border on Tributaries or Surface Waters or Reservoirs;

(f) within land that overlays an Aquifer with a potential well yield of 100 gallons per minute or more as determined in accordance with St. 1992 c. 36 and 350 CMR 11.00; or

(g) within land that overlays an Aquifer with a potential well yield of one or more but less than 100 gallons per minute pursuant to a finding by the Division, in consultation with the Department, that regulation of said Aquifer is necessary for the protection of the quality of the water in the Surface Waters, Aquifers, Reservoirs or Tributaries.

(2) *Presumptions - Properties Identified in the List of Affected Parcels.* For purposes of 350 CMR 11.00, all properties identified in the List of Affected Parcels shall be presumed to be in an area regulated under 350 CMR 11.04(1)(a) through (g). Any property which is not identified in the List of Affected Parcels shall be presumed not to be in an area regulated under 350 CMR 11.04(1)(a) through (f).

(3) *Uses and Activities Regulated or Prohibited.*

(a) Any Alteration, or the Generation, Storage, Disposal or Discharge of Pollutants is prohibited within those portions of the Watershed that lie:

1. within 400 feet of the Bank of a Reservoir (350 CMR 11.04(1)(a)); or
2. within 200 feet of the Bank of a Tributary or Surface Waters (350 CMR 11.04(1)(b)).

(b) 1. Within those portions of the Watershed that lie:

- a. within the area between 200 and 400 feet of the Bank of a Tributary or Surface Water (350 CMR 11.04(1)(c));
- b. within the Flood plain of a Tributary or Surface Water (350 CMR 11.04(1)(d));
- c. within Bordering Vegetated Wetlands that border on Tributaries or Surface Waters or Reservoirs (350 CMR 11.04(1)(e));
- d. within land that overlays an Aquifer with a potential well yield of 100 gallons per minute or more as determined in accordance with St. 1992 c. 36 and 350 CMR 11.00 (350 CMR 11.04(1)(f)); or
- e. within land that overlays an Aquifer with a potential well yield of one or more but less than 100 gallons per minute, pursuant to a finding by the Division, in consultation with the Department, that regulation of said Aquifer is necessary for the protection of the quality of the water in the Surface Waters, Aquifers, Reservoirs or Tributaries (350 CMR 11.04(1)(g)),

2. The following uses are prohibited:

- a. the Disposal of Pollutants from either privately or publicly owned Sewage Treatment Facilities;

- b. the placement of the Leaching Field of a Subsurface Waste Water Disposal System less than four feet above the maximum water table level as measured at the time of annual high water;
- c. the storage of liquid petroleum products of any kind; provided, however, that an end user of such product, such as a resident in connection with normal residential use or a person responsible for supplying heat to a residence, may store a reasonable volume of such material so long as such storage is in a free standing container inside of the Structure, which Structure shall include at a minimum a foundation thereof with a poured cement slab floor or a concrete reservoir of sufficient volume to hold 125 percent of the tank's capacity;
- d. the Treatment, Disposal, use, generation or Storage of Hazardous Material or Waste, except a reasonable volume of Hazardous Material or Waste incidental to normal residential use;
- e. the Storage and the Disposal of solid waste other than a reasonable volume incidental to normal residential use;
- f. the outdoor Storage of road salt or other de-icing chemicals; provided, however, that 350 CMR 11.00 shall not prohibit the outdoor Storage of sand, gravel or materials used in road construction which are not Hazardous Materials or Waste;
- g. the outdoor Storage of fertilizers, herbicides and pesticides;
- h. the use or Storage of pesticides or herbicides which carry a mobility rating as provided for by the United States Environmental Protection Agency or which have been determined by the Commonwealth using United States Environmental Protection Agency standards to pose a threat or potential threat to Ground water;
- l. the outdoor, uncovered Storage of manure;
- j. the servicing, washing or repairing of boats or motor vehicles other than as reasonably incidental to normal residential use;
- k. the operation of junk and salvage yards;
- l. the rendering Impervious of more than ten percent of any Lot or 2,500 square feet, whichever is greater;
- m. the excavation of gravel and sand to a depth greater than six feet above the maximum water table, except where incidental to the construction of permitted Structures;
- n. the Alteration of Bordering Vegetated Wetlands;
- o. any other activity which could degrade the quality of the water in the Watersheds as determined by the Division after consultation with the Department; provided, however, that de-icing may be performed on a roadway under procedures approved by the Commonwealth's Secretary of Environmental Affairs; or
- p. the construction of any Dwelling which exceeds a density of two bedrooms per acre or any use which may generate more than 220 gallons of sanitary sewage per acre per day.

(c) In addition to, and without limiting, the prohibitions contained in 350 CMR 11.04(3)(a) and (3)(b), within those portions of the Watersheds which overlay Aquifers with potential well yields of between 100 and 300 gallons per minute as determined by the Division, or land whose regulation has been determined to be necessary for the protection of the quality of the water in the Surface Waters, Aquifers, Reservoirs and Tributaries, pursuant to 350 CMR 11.04(1)(g), the construction of any Dwelling which exceeds a density of one and one-third bedrooms per acre and any use which may generate more than 147 gallons of sanitary sewage per acre per day are prohibited.

(d) In addition to, and without limiting, the prohibitions contained in 350 CMR 11.04(3)(a), (3)(b) and (3)(c), within those portions of the Watersheds that overlay Aquifers with potential well yields of over 300 gallons per minute as determined by the Division, the construction of any Dwelling which exceeds a density of one bedroom per acre and any use which may generate more than 110 gallons of sanitary sewage per acre per day are prohibited.

(e) In making the calculation required under 350 CMR 11.04(3)(b)2.i. all contiguous real property within an area described in 350 CMR 11.04(1) owned by the same Person shall be used, in the aggregate; provided, however, that said area may be so used in making such calculation for only one Lot.

(f) In making the calculation required under 350 CMR 11.04(3)(b)2.p., all contiguous real property within an area described in 350 CMR 11.04(1) owned by the same Person shall be used, in the aggregate, to determine the total acreage for density purposes; provided, however, that said area may be so used for determining area density for only one Lot.

11.05: Exemptions

The provisions of 350 CMR 11.04 shall not apply to the following:

(1) Uses, Structures or Facilities in Existence. Uses, Structures or facilities lawfully in existence or for which all applicable municipal, state and federal permits and approvals, other than building permits and permits for septic systems, were obtained prior to July 1, 1992;

(2) Reconstruction, Extension or Structural Change. Any reconstruction, extension or structural change to any Structure lawfully in existence on July 1, 1992, provided that such reconstruction, extension or structural change:

(a) does not constitute a substantial change to or enlargement of that lawfully existing Structure; and

(b) does not degrade the quality of the water in the Watershed;

(3) Lot in Existence. The construction of one single-family Dwelling on any Lot existing as such prior to July 1, 1992, or the division of an owner occupied Lot existing as such as of July 1, 1992 into one additional Lot for a single family dwelling; provided that, wherever possible, there shall be no Alterations within the areas described in 350 CMR 11.04(1)(a) and 11.04(1)(b);

(4) Construction - Sewer System. The construction of any Dwelling described in 350 CMR 11.04(3)(b)2.p., 11.04(3)(c) or 11.04(3)(d) if a Sewer System existed prior to July 1, 1992 to which a direct connection shall be made without expansion of capacity and said connection is used for all sanitary sewage of any Dwelling or other Structure resulting from said construction;

(5) Tributaries. Tributaries, or portions thereof, which the Division, in consultation with the Department, has exempted pursuant to 350 CMR 11.00, upon a determination that such exemption will pose no

significant risk to the quality of the water, after taking into account the rate of flow, slope, soil characteristics, proximity to a Reservoir or the Ware River above the Ware River intake, the current level of water quality and the current degree of development;

(6) Work of the Division. The Division, in the performance of its responsibilities and duties to protect the quality of the water in the Watersheds, or the Authority in the performance of its responsibilities and duties to maintain, operate and improve the Waterworks System;

(7) Conversion of Land for Agricultural Use. Conversion of Land for Agricultural Use or preparation of Land for Agricultural Use; provided, however, that such conversion shall be made under a plan approved by the United States Department of Agriculture, Soil Conservation Service and the Commission, in consultation with the Commonwealth's Department of Food and Agriculture;

(8) Maintenance of Public Roadways in Existence. The maintenance, repair, replacement or reconstruction of public roadways existing as of September 1, 1989 or railroad track and rail bed existing as of September 1, 1990, including associated drainage systems, that are necessary to preserve or restore the facility's serviceability for the number of travel lanes and uses existing as of September 1, 1990; provided, however, that in the case of any replacement the design is substantially the functional equivalent of, and is of similar alignments to that which is being replaced; provided, further, that design plans and specifications for said work on roadways, or railroad track and rail beds are provided to the Division prior to the work's commencement;

(9) Maintenance or Improvement - Agricultural. Activities relating to normal maintenance or improvement of Land in Agricultural Use; provided, however, that such activities do not impair the quality of the water;

(10) Construction of Public Highways. The construction of public highways, railroad track and rail beds and facilities directly related to their operation; provided, that the Commonwealth's Secretary of Environmental Affairs has determined that such highway or transportation service construction project requires direct access to or location in the lands described in 350 CMR 11.04(1) to avoid or minimize damages to the environment and that said Secretary and the Division have determined that such construction does not materially impair the quality of the water in the Watersheds;

(11) Maintenance of Public Utilities. The maintenance, repair or expansion of lawfully located Structures or facilities used in the service of the public to provide electric, gas, water, sewer, telephone, telegraph and other telecommunication services; provided, however, that such maintenance, repair or expansion activities, Structures, or facilities do not materially impair the quality of water in the Watersheds as determined by the Division after consultation with the Department;

(12) Maintenance of Public Utilities - Wetlands. The maintenance, repair or replacement, but not the substantial changing or enlargement of, an existing and lawfully located Structure or facility used in the service of the public and used to provide electric, gas, water, sewer, telephone, telegraph and other telecommunication services in Bordering Vegetated Wetlands; provided, however, that such maintenance and repair activities do not materially impair the quality of water in the Watersheds;

(13) Clean up or Prevention of Releases. The undertaking by any Person, municipality, the United States government or the Commonwealth of temporary operations to clean up, prevent or mitigate releases of Hazardous Material or Waste;

(14) Changes in Agricultural Crops Produced. Changes in agricultural crops produced;

(15) Agricultural Technologies. The use of new or existing agricultural technologies that do not degrade the quality of water in the Watersheds more than the present agricultural technologies that such new or existing agricultural technologies replace; and

(16) Municipal Sewage Treatment Facility or Water System. The construction of a new municipal Sewage Treatment Facility or new municipal water system if the Division determines that water quality will not be adversely impacted from said construction and provided that such new systems comply with all existing regulations and standards applicable to water pollution abatement districts.

11.06: Procedures

(1) Advisory Rulings

(a) *Request for Advisory Ruling*. Any person Owning an Interest in Real Property may, by written request to the Division at the addresses specified in 350 CMR 11.11 by certified mail or hand delivery, request an Advisory Ruling as to:

1. whether such Person's property is located within an area regulated by St. 1992 c. 36 or 350 CMR 11.00; or
2. whether existing or proposed Structures, Uses or Activities on such Person's property are permitted under St. 1992 c. 36 or 350 CMR 11.00 by virtue of the exemptions set forth in 350 CMR 11.05.

(b) *Information Required*. Such written request shall identify the property by street address and include:

1. a copy of the current Assessor's Map showing the location of the property or reference to the applicable Assessor's Map by sheet and parcel number;
2. a copy of (or reference to) the most recent edition of the Massachusetts Geographic Information System map based on the United States Geological Survey, 1 to 25,000 scale, quadrangle maps, showing the location of the property;
3. a copy of such Owner's deed as recorded in the applicable registry of deeds; and
4. copies of any plans, mortgage inspection plans and tape surveys of the property which are available.

(c) *Issuance of Advisory Ruling*. Within 30 days of the Date of Submission of a request for Advisory Ruling, the Division may issue a written ruling to the Person who submitted the request, or in its sole discretion, the Division may notify such Person that a request for Watershed determination of applicability is required pursuant to 350 CMR 11.06(2).

(d) *Remedy*. The Person to whom an Advisory Ruling is issued shall have no right to appeal such ruling, but may at such Person's election, submit a request for Watershed determination of applicability or an application for variance in accordance with 350 CMR 11.00. A Person who has not been issued an Advisory Ruling within 30 days may, at such Person's election, resubmit the request, or submit a request for Watershed Determination of Applicability or an application for variance in accordance with 350 CMR 11.06.

(e) *Authorization; limitations*. Any Advisory Ruling hereunder shall be issued by the Division pursuant to and subject to the limitations of M.G.L. c. 30A, § 8.

(2) Requests for Watershed Determinations of Applicability

(a) *Filing.* Any Person Owning an Interest in Real Property who desires a determination as to whether or not:

1. such Person's property is located within an area regulated by St. 1992 c. 36 or 350 CMR 11.00;
2. proposed Structures, Uses or Activities on such Person's property are permitted under St. 1992 c. 36 or 350 CMR 11.00;
3. a reconstruction, extension or structural change constitutes a substantial change or enlargement or one which will degrade the quality of water under 350 CMR 11.05(2);
4. Alterations within areas described in 350 CMR 11.04(1)(a) and 11.04(1)(b) in connection with construction permitted under 350 CMR 11.05(3) are possible;
5. the maintenance, repair or replacement activities described in 350 CMR 11.05(9), (10) or (11) will impair or materially impair the quality of the water in the Watersheds; or
6. a new municipal Sewage Treatment Facility or new municipal water system will have an adverse impact on water quality under 350 CMR 11.05(16),

may submit to the superintendent of the Reservoir of the Watershed in which such property is located at the address specified in 350 CMR 11.11, by certified mail or hand delivery, a request for Watershed determination of applicability (See 350 CMR 11.13).

(b) *Land Surveyor Determination.* Any request for Determination under 350 CMR 11.06(2)(a)1. shall be accompanied by a written determination of a land surveyor registered with the board of registration of professional engineers and land surveyors of the Commonwealth as to whether such Person's real property interests are located within areas regulated by St. 1992 c. 36.

(c) *Related Statement.* Requests for Watershed Determinations other than those in 350 CMR 11.06(2)(a)1. shall include a detailed description of the Structures, Uses and Activities which are proposed.

(d) *Additional Materials.* All surveys and additional materials or studies required to make a determination, whether or not requested by the Division, shall be prepared and delivered at the sole cost of the Person desiring the determination.

(e) *Issuance of Applicability Decision.* Within 60 days of the Date of Submission of such request for Watershed Determination, the Division shall issue a written Applicability Decision to the Person who submitted such request, in form suitable for recording in the registry of deeds or registration in the registry district of the land court where the property is located (See 350 CMR 11.13), which shall contain a brief statement of the reasons for the Decision. If the Division fails to issue the Applicability Decision within such 60 day period, the Division shall be deemed to have:

1. concurred with the land surveyor's determination set forth in a request for Determination under 350 CMR 11.06(2)(a)1.; or
2. determined that the proposed Structures, Uses and Activities on such Person's property described in the request for Determination are permitted by St. 1992 c. 36 and 350 CMR 11.00; or

3. determined that such Structures, Uses and Activities will not impair or materially impair the quality of water in the Watersheds.

(f) *Appeal.* A Person to whom the Division's Applicability Decision has been issued, who seeks to appeal such Decision, shall file a Notice of Claim for an Adjudicatory Proceeding with the Commission at the address specified in 350 CMR 11.11 within 21 days from the Date of Issuance of the Decision by the Division. The procedures for appeal before the Commission shall be as set forth in 801 CMR 1.00 et seq. At the time of filing of such Notice of Claim, a copy shall also be filed with the Division.

(3) Variances

(a) *Variances.* The Division may grant a variance from the provisions of St. 1992 c. 36 and 350 CMR 11.00 with respect to particular Structures, Uses and Activities, and shall grant, upon request, a variance with respect to crossings of Tributaries and Bordering Vegetated Wetlands, where the Division specifically finds that owing to circumstances relating to the soil conditions, slope, or topography of the land affected by such Structures, Uses or Activities, desirable relief may be granted without substantial detriment to the public good and without impairing the quality of water in the Watersheds.

(b) *Presumptions and Standards for Required Findings.*

1. There shall be a presumption that granting a variance from the applicability of St. 1992 c. 36 and 350 CMR 11.00 to specific Structures, Uses and Activities is contrary to the achievement of the purpose of St. 1992 c. 36. This presumption may be rebutted only by the submission of credible evidence by the Person submitting the application for variance to establish that such variance may be granted without substantial detriment to the public good and without impairment of water quality in the Watersheds.

2. The standard of substantial detriment to the public good shall mean a factual determination by the Division of the overall effect of the proposed Structure, Use or Activity at a particular location in relation to the purpose of St. 1992 c. 36.

3. The standard of impairment of water quality shall mean:

a. the risk of water quality impairment presented by Structures, Uses and Activities which are permissible under all other relevant federal, state and local laws, but would not be permissible under 350 CMR 11.00 without a variance; and

b. the cumulative risk of water quality impairment from all Structures, Uses and Activities allowed under current regulations over time.

(c) *Applications.* Any Person Owning an Interest in Real Property may make an application for variance to the Division (See 350 CMR 11.13) by filing the same by certified mail or hand delivery with the Division at the address specified in 350 CMR 11.11. A copy of the application for Variance shall be sent to the Department at the address specified in 350 CMR 11.11.

(d) *Detailed Statement.* The application for variance shall include a detailed description of the Structures, Uses and Activities proposed on such Person's property. The application for variance shall include detailed information regarding each specifically enumerated factor stated in 350 CMR 11.06(3)(a). Detailed information regarding each factor shall be provided as follows:

1. *Soil Conditions.* A map prepared at a minimum scale of 1"=100' indicating the soil types as mapped by the USDA Soil Conservation Service ("SCS") shall be provided. Site specific soils data, including borings, test pits and percolation tests, may be submitted including copies of all field logs, notes, observations, conclusions and test methods employed. A detailed analysis of the soil characteristics of erodibility and permeability shall be provided. Permeability should be described in terms of percolation rate measured as minutes per inch as specified in Title 5 (310 CMR 15.00).

2. *Slope.* Calculations of the ground slope at all lands within the areas that would be subject to St. 1992 c. 36 if the variance were not granted shall be provided. The results of such calculations shall be presented graphically on a map prepared at a scale of 1"=100' or larger, expressed as percent slope. Where applicable, the average slope of a Tributary measured as the change in elevation divided by the distance in stream miles from the upstream point of the Tributary at or near such Person's property to the downstream point of the Tributary at or near such Person's property shall also be stated.

3. *Topography.* A topographical plan at a minimum scale of 1"=100' or larger showing contour elevations at two foot intervals shall be submitted. Said plan shall be prepared and stamped by a professional surveyor or engineer registered in the Commonwealth of Massachusetts and shall show the location of all areas which would be subject to St. 1992 c. 36 if the variance were not granted. The plan shall show the location of all Ground water, soil and percolation test locations. Such topographic information as depth to the maximum annual high Ground water table, depth to ledge or refusal, and distances from all mapped and unmapped streams, ponds and water bodies shall also be provided.

4. *Water Quality.* The application shall include a detailed analysis of the impacts on Surface Water and, where applicable, Ground water quality of any proposed Structure, Use or Activity which would be allowed if the variance is granted. An evaluation of the potential impact of such proposed Structure, Use or Activity on water quality by reference to the Department's Surface Water Quality Standards for Class A Surface Waters and Outstanding Resource Waters of the Commonwealth, set forth in 314 CMR 4.00 et seq., and/or where applicable, the Massachusetts Ground Water Quality Standards, set forth in 314 CMR 6.00 et seq. shall be provided. The application shall include the water quality data and results to support each analysis and shall provide a detailed description of any methodology employed in performing such analysis to show that water quality will not be impaired by the Structure, Use and Activity for which the variance is being requested, whether during construction or upon continued use or operation of such Structure, Use or Activity.

5. *Mitigating Measures.* The application shall include an analysis of any mitigating measures which will be used which would enable the Division to grant a variance without substantial detriment to the public good and without impairing the quality of water in the Watersheds.

(e) *Additional Materials.* All surveys and additional materials or studies required to act on an application for variance, whether or not requested by the Division, shall be prepared and delivered at the sole cost of the Person submitting the application.

(f) *Public Hearing.* Within 30 days of the Date of Submission of the application for variance with the Division, the Division shall hold a public hearing. Notice of the time and place of the public hearing shall be given by the Division, at the expense of the Person who submitted the application, not less than five days prior to such hearing by publication in a newspaper of general circulation in the city or town where the property in question is located and by mailing a copy of such notice to the Person who submitted the application at the address specified in the application, and to the Building Inspector, Conservation Commission, and Board of Health in such

city or town. At the request of the Person who submitted the application filed with the Division at least two days before the date of such hearing, the date of the hearing may be rescheduled to a time which is mutually convenient for such Person and the Division, provided that such rescheduled time shall permit re-publication of notice as provided herein.

The public hearing may be continued, with the consent of the Person who submitted the application, to an agreed upon date, which shall be announced at the hearing. At the public hearing, such Person may be represented by counsel and/or professional consultants and may present oral or written evidence and oral or written testimony of witnesses.

(g) *Variance Decision.* Within 30 days of the close of the public hearing, the Division shall issue a written Variance Decision on the application for variance. If the variance is granted, the Division may impose in the Variance Decision such reasonable conditions, safeguards and limitations as it may find desirable in its sole discretion, which, based on the application for variance and the evidence presented at the public hearing, are necessary to protect the water in the Watersheds. If a variance is denied, the Variance Decision shall contain a brief statement of the reasons for the denial. The granting of a variance is limited to the provisions of St. 1992 c. 36. All other applicable laws, regulations and ordinances shall not be affected by the granting of a variance.

(h) *Recording of Variance Decision.* No variance granted hereunder shall take effect until a Variance Decision (See 350 CMR 11.13) shall have been recorded and indexed in the grantor index in the registry of deeds or registered in the registry district of the land court for the county or district where the property is located, containing any conditions applicable thereto and describing the land by metes and bounds or by reference to a recorded or registered plan showing the property's boundaries.

(i) *Appeal.* A Person to whom a Variance Decision is issued, who seeks to appeal the Division's Variance Decision, shall file a Notice of Claim for an Adjudicatory Proceeding with the Commission at the address specified in 350 CMR 11.11 within 21 days from the Date of Issuance of the Variance Decision by the Division. The procedures for appeal before the Commission shall be as set forth in 801 CMR 1.00 et seq. At the time of filing of such Notice of Claim, a copy shall also be filed with the Division.

(4) Exemption of a Tributary

(a) *Exemption of a Tributary.* The Division, in consultation with the Department, may exempt a Tributary, or portions thereof, upon a determination that such exemption will pose no significant risk to the quality of water, after taking into account the following factors:

1. rate of flow;
2. slope;
3. soil characteristics;
4. proximity to a Reservoir or the Ware River above the Ware River intake;
5. the current level of water quality; and
6. the current degree of development.

(b) *Presumptions and Standards for Required Findings.*

1. The standard of no significant risk to the quality of water refers to:
 - a. the risk of water quality impairment presented by Structures, Uses and Activities which are permissible under all other relevant state, federal and local laws, but would not be permissible under 350 CMR 11.00 without an exemption; and
 - b. the cumulative risk of water quality impairment from all Structures, Uses and Activities allowed under current regulations over time.
2. There shall be a presumption that exempting a Tributary or portion thereof is contrary to the achievement of the purpose of St. 1992 c. 36. The presumption may be rebutted only by the submission of credible evidence by the Person submitting the request for Exemption to establish that such exemption will pose no significant risk to the quality of water, taking into account the factors enumerated at 350 CMR 11.06(4)(a).

(c) *Requests for Exemption.*

1. A request for Exemption of a Tributary may be made by:
 - a. An affected landowner;
 - b. Any state agency or regional planning commission;
 - c. The Board of Selectmen, City Council, Mayor, Planning Board or Conservation Commission of any city or town which would be affected by the exemption; or
 - d. The Governor or any member of the General Court.
2. A request for Exemption of a Tributary shall be made to the Division (See 350 CMR 11.13) by filing the same by certified mail or hand delivery with the Division at the address specified in 350 CMR 11.11. A copy of the request for Exemption of a Tributary shall be sent to the Department at the address specified in 350 CMR 11.11.

(d) *Detailed Statement.* The request for Exemption of a Tributary shall include detailed information regarding each specifically enumerated factor listed in 350 CMR 11.06(4)(a)1. through 6. Such detailed information shall be provided based on conditions existing as of the time of the request and based on conditions which would, or may, result if such exemption were granted and if development occurred to the maximum extent and type allowed by current law. Detailed information on each factor shall be provided as follows:

1. *Flow Rate.* The request shall include the flow rate of the Tributary stated as the annual average daily stream flow, reported as cubic feet per second ("cfs") as measured at the downstream point of discharge for the Tributary or portion thereof, taking into account the entire contributing drainage area. Such flow rate may be based on field data collected in accordance with accepted stream flow measurement methods as established by the United States Geologic Survey, or estimated based on procedures established by the United States Geologic Survey. The request shall describe, in depth, the basis and method employed for the reported flow rate to assess full build-out scenarios.
2. *Slope.* The request shall state the average slope at the Tributary measured as the change in elevation divided by the distance in stream miles from its source to the downstream point of discharge. The ground slope of all lands adjacent to the Tributary

within the areas that would be subject to St. 1992 c. 36 if the exemption were not granted shall be calculated and the results of such calculations shall be presented graphically on a map prepared at a scale of 1"=100' or larger, expressed as percent slope.

3. *Soil Characteristics.* A map prepared at a minimum scale of 1"=100' shall be submitted indicating the soil types as mapped by the SCS. Site specific soils data supporting or contradicting the SCS soil mapping including borings, test pits and percolation tests may be submitted including copies of all field logs, notes, observations, conclusions and test methods employed. A detailed analysis of the soil characteristics of erodibility and permeability shall be provided. Permeability should be described in terms of a percolation rate measured as minutes per inch as specified in Title 5 (310 CMR 15.00).

4. *Proximity to a Reservoir or the Ware River above the Ware River Watershed.* Proximity of the Tributary proposed to be exempted to a Reservoir or the Ware River above the Ware River intake shall be indicated by reference to the Protection Zone, defined by the Department's Division of Water Supply, Watershed Resource Protection Plan Policy as Zone A, Zone B and Zone C. The measured distance in stream miles from the downstream discharge point of the Tributary or portion thereof in question from that Tributary's ultimate point of confluence with a Reservoir or stream miles above the Ware River intake shall be stated.

5. *Water Quality.* The request shall include water quality monitoring data for the Tributary consisting of, at a minimum monthly samples for a continuous one year period at a sampling station located at or near the downstream point of discharge of the Tributary or portion thereof for which exemption is requested. Water quality data of the Division and the Department may be utilized in satisfaction of this requirement where such data is available. Minimum analysis shall include fecal coliform bacteria, color, turbidity, temperature, pH, dissolved oxygen, total suspended solids, total phosphorus, ammonia nitrogen and chloride. A detailed analysis of the water quality data with reference to the Department's Surface Water Quality Standards for Class A Surface Waters and Outstanding Resource Waters of the Commonwealth, 314 CMR 4.00 *et seq.*, shall be provided. The request shall include a detailed analysis of the impact on water quality of any potential Structures, Uses or Activities allowed if the exemption is granted.

6. *Development.* A general plan showing existing land use within the contributing drainage area upstream at the point of discharge of the Tributary or portion thereof shall be provided. The request shall include a calculation of the percent imperviousness of the contributing drainage area based on the existing land uses shown and shall indicate the change of percent imperviousness which may result from any Structures, Uses or Activities allowed or proposed if the exemption is granted.

7. *Other Information.* The request shall include a detailed description of the Structures, Uses and Activities which are or may be proposed to occur within those areas which would be subject to St. 1992 c. 36 without the exemption and shall include an analysis of any mitigating measures which will be used which would ensure that granting the exemption would present no substantial risk to the quality of water.

(e) *Additional Materials.* All surveys and additional materials or studies required to act on a request for Exemption of a Tributary, whether or not requested by the Division, shall be prepared and delivered at the sole cost of the Person submitting the request.

(f) *Public Hearing.* Within 30 days of the Date of Submission of the request for Exemption of a Tributary with the Division and the Department, the Division and the Department shall hold a public hearing. Notice of the time and place of the public hearing shall be given by the Division, at

the expense of the Person who submitted the request, not less than five days prior to such hearing by publication in a newspaper of general circulation in the city or town where the property in question is located and by mailing a copy of such notice to the Person who submitted the request at the address specified in the request, and to the Building Inspector, Conservation Commission and Board of Health in such city or town. At the request of the Person who submitted the request filed with the Division at least two days before the date of such hearing, the date of the hearing may be rescheduled to a time which is mutually convenient for such Person, the Division and the Department, provided that such rescheduled time shall permit re-publication of notice as provided herein. The public hearing may be continued, with the consent of the Person who submitted the request, to an agreed upon date, which shall be announced at the hearing. At the public hearing, such Person may be represented by counsel and/or professional consultants and may present oral or written evidence and oral or written testimony of witnesses.

(g) *Exemption Decision.* Within 60 days of the close of the public hearing, the Division shall issue a written Exemption Decision on the request for Exemption of a Tributary. If the exemption is granted, the Division may impose in the Exemption Decision such reasonable conditions, safeguards and limitations as it may find desirable in its sole discretion, which, based on the request for Exemption of a Tributary and the evidence presented at the public hearing, are necessary to protect the water in the Watersheds. If the exemption is denied, the Exemption Decision shall contain a brief statement of the reasons for the denial. The granting of an exemption is limited to the applicability of St. 1992 c. 36. All other applicable laws, regulations and ordinances shall not be affected by the granting of an exemption.

(h) *Notice of Exemption.* Notice of the Exemption Decision shall be mailed to the Person who submitted the request, and to the City Council or Board of Selectmen in the city or town where the Tributary is located. Notice shall also be published once in a newspaper of general circulation in such city or town, provided, however, that a failure to publish shall not affect the validity of the Exemption Decision. A record of the Exemption Decision shall be kept on file with the Division and, if a Tributary or portion thereof is exempted, the affected area shall be shown on the most recent edition of the Massachusetts Geographic Information System Map (See 350 CMR 11.07).

(i) *Appeal.* A Person to whom an Exemption Decision is issued, who seeks to appeal the Division's Exemption Decision, shall file a Notice of Claim for an Adjudicatory Proceeding with the Commission at the address specified in 350 CMR 11.11 within 21 days from the Date of Issuance of the Exemption Decision by the Division. The procedures for appeal before the Commission shall be as set forth in 801 CMR 1.00 *et seq.* At the time of filing of such Notice of Claim, a copy shall also be filed with the Division.

(5) Work Pending Appeal of Applicability Decision, Variance Decision or Exemption Decision - No Alterations shall be made or Structures, Uses or Activities commenced until a final administrative or judicial determination has been made and all appeal periods shall have expired if the Division issues:

(a) an Applicability Decision that the property is located in an area regulated by St. 1992 c. 36, that the Structures, Uses or Activities proposed are prohibited by St. 1992 c. 36 under 350 CMR 11.04(3), or that the Structures, Uses or Activities will impair or materially impair the quality of water in the Watersheds; or

(b) a Variance Decision denying the variance requested in an application for variance; or

(c) an Exemption Decision denying a request for Exemption of a Tributary.

11.07: Maps

(1) *Aquifers*. The location and potential well yield of Aquifers shall be determined by reference to the most recent edition of maps generated by the Massachusetts Geographic Information System based on the United States Geological Survey Water Resource Atlases.

(2) *Flood plains*. The location of Flood plains shall be made by reference to the most recent edition of the Flood Hazard Boundary Maps issued by the Federal Emergency Management Agency.

(3) *Surface Waters and Tributaries*. The location of Surface Waters and Tributaries shall be determined by reference to the most recent edition of maps generated by the Massachusetts Geographic Information System based on the United States Geological Survey, 1 to 25,000 scale quadrangle maps.

(4) *Adoption of More Accurate Maps*. With respect to any of the maps referred to in 350 CMR 11.07, the Division, in consultation with the Department, may adopt more accurate maps pursuant to notice and a public hearing as provided by M.G.L. c. 30A. The Division shall file any of such maps which are adopted with the Clerk of the House of Representatives and Clerk of the Senate and such maps shall not take effect until 90 days have elapsed from the time of said filing. Copies of maps which have taken effect shall be filed with the Chief Executive Officers of all cities and towns within the Watersheds, provided that the Division's failure to do so shall not invalidate the maps or any actions taken by the Division in connection therewith.

11.08: Relationship of Act with other State and Municipal Statutes, Ordinances and Regulations

350 CMR 11.00 is intended solely for use in administering St. 1992 c. 36; nothing contained herein should be construed as preempting or precluding more stringent protection of the areas regulated by St. 1992 c. 36 by other statutes, ordinances, by-laws or regulations. The duties and obligations imposed by St. 1992 c. 36 shall be in addition to all other duties and obligations imposed by any general or special law or regulation or any by-law, ordinance or regulation lawfully adopted pursuant thereto.

11.09: General Rules and Regulations for the Protection of Watersheds and the Watershed System

In order to facilitate review of all regulations promulgated by the Commission and the Division relating to Watersheds and the Watershed System, this Section includes regulations of general applicability to Waters of the Watershed System. The regulations in 350 CMR 11.09 are intended to supersede the regulations in 310 CMR 23.00, 350 CMR 8.01, 350 CMR 9.00, and 350 CMR 10.00.

(1) Waters of the Watershed System

(a) No Person shall take or divert any Waters of the Watershed System of the Commission and no Person shall corrupt, render impure, waste or improperly use any such water.

(b) No Person shall:

1. engage in any construction activity involving filling, dredging, grubbing or altering land without adequate provisions to prevent erosion resulting in clay, silt or other turbidity laden waters from entering the Waters of the Watershed System;

2. construct, establish or maintain any agricultural facility or place where animal manure may be deposited or accumulated without adequate provision to prevent any manure or other Pollutant from flowing or being washed into the Waters of the Watershed System;

3. engage in any other activity which could degrade the quality of Waters of the Watershed System or interfere with their use as a source of water supply.

(c) No Person shall allow a condition to exist on such Person's property which could result in the direct or ultimate discharge of any Pollutant into the Waters of the Watershed System.

(d) Any records of any board of health or health agent concerning matters within the Watershed shall be open to inspection by the employees and agents of the Commission and the Department.

(e) Whenever an incident occurs, is likely to occur, or a situation exists that threatens to add Pollutants to the Waters of the Watershed System, the Person causing or contributing to the pollution or potential pollution shall notify the Commission and the Department immediately.

(2) Watershed System

(a) General Regulations.

1. Entrance on and exit from land of the Watershed System shall be made through gates or other designated areas.
2. No Person is allowed within any land of the Watershed System, except from one hour before sunrise to one hour after sunset, unless authorized by a written permit from the Commission or its designee.
3. Powered boats are prohibited within the Waters of the Watershed System except in areas designated by the Commission or its designee.
4. All acts which pollute or may pollute the water supply are prohibited. No litter or refuse of any sort may be thrown or left in or on any land or water within any Watershed System. All Persons within said System shall use the sanitary facilities provided for public use.
5. All acts which injure the property of the Commonwealth are prohibited. No Person shall injure, deface, destroy, remove or carry off any property, real or personal, under the care and control of the Commission, including but not limited to, all historic artifacts and natural materials. The removal of gravel, topsoil, stones, boulders, or other earthen material is prohibited from the Watershed System except for removal for official use for land management purposes by Commission staff. No Person shall build or construct any object or structure of the property of the Commonwealth except with the written permission of the Commission or its designee.
6. Cooking and all fires are prohibited within the Watershed System.
7. No Person shall wade or swim in any reservoir except wading while using boots for the purpose of launching boats at designated boat launch areas.
8. No Person shall wade or swim in any Tributary or Surface Waters on or within the property of the Commonwealth except at areas designated by the Commission or its designee.
9. Organized sports activities, including but not limited to orienteering and baseball, are prohibited in the Watershed System except by written permit from the Commission or its designee.

10. Any violation of 350 CMR 11.09 will be deemed sufficient cause for revocation of fishing privileges for a period of time not less than one year from the time of violation. The Commission and its employees are not responsible for any damage to or loss of property sustained by fishermen, or for any injury or loss of life which may be incurred in connection with public use of the reservoirs and Watershed System.

11. Breach of peace, profanity or other disorderly conduct offensive to the general public is strictly prohibited within the Watershed system. Possession of and drinking of alcoholic beverages is prohibited within said System.

12. No Person shall drive a motorized vehicle within the Watershed System except upon roads authorized for such use by the Commission or its designee. Recreational vehicles are prohibited on all Watershed System property except the use of snowmobiles in areas designated by the Commission or its designee. Motor vehicles shall be parked only in areas designated by the Commission or its designee. Operators of motor vehicles shall obey all regulatory signs unless otherwise directed by a police officer or person in charge. No Person shall willfully obstruct the free passage of vehicles or Persons within the Watershed System. Vehicle access for official use may be granted by the Commission or its designee.

13. No Person shall bring any animal within any Watershed System property except for horses and dogs at the Ware River Watershed at areas designated by the Commission or its designee.

14. The use of bicycles, skis and other means of non-motorized transportation within the Watershed system shall be permitted only in areas designated by the Commission or its designee.

15. No Person, except in an emergency, shall bring, land or cause to descend within any Watershed System property any aircraft except with a written permit from the Commission or its designee.

16. Parades, games, fairs, carnivals, fishing derbies, bazaars, gifts or solicitations for raising or collecting funds shall not be permitted within the Watershed System without written approval of the Commission or its designee.

17. Lotteries, raffles, gambling and games of chance are prohibited; and no Person shall have possession of machinery, instruments or equipment of any kind for use of same in the Watershed System.

18. Public assemblies of more than 25 persons shall not be allowed within the Watershed System without a written permit from the Commission or its designee.

19. No Person shall engage in any business, sale or display of goods or wares within the Watershed System without a written permit from the Commission or its designee.

20. Commercial signs and advertising are prohibited in the Watershed System.

21. No Person shall have possession of or discharge any weapon, firearm, fireworks, or other explosive on or within the Watershed System except at times and areas designated by the Commission or its designee. All forms of target shooting are prohibited on or within the Watershed System.

22. No Person may hunt, shoot or trap animals on or within any Watershed System property except at times and in areas designated by the Commission or its designee.

23. All Persons within the Watershed System shall obey the lawful directions of regulatory signs, police officers or persons in charge, or of Federal or Commonwealth wardens or enforcement officers.

24. The Watershed System or parts thereof may be closed for public access at the discretion of the Commission or its designee when necessary to protect the lands and waters under the care and control of the Commission.

25. The possession of all types of metal detectors or similar devices is prohibited on all of the Watershed System property.

(b) Special Regulations for Quabbin Reservoir.

1. Persons in compliance with Commonwealth Fish and Game Laws and Regulations, will be allowed to fish from shore in areas designated by the Commission or its designee. A valid state fishing or sporting license is required by any Person renting or launching a boat at any Commission facilities subject to 350 CMR 11.09. Reasonable fees for the use of boats, for rental of outboard motors for fishing purposes, or use of Commission facilities including parking and boat ramps, may be charged by the Commission.

2. Persons permitted to fish from boats shall, at all times, be responsible for the sanitary condition of the boats. Persons under 16 years of age must be accompanied by a Person possessing a valid fishing license in order to boat on Quabbin Reservoir.

3. Only boats of a minimum length of 12 feet, and of a type considered safe by the Commission representative in charge, shall be used. No inboard motors, collapsible boats, sailboats, pontoon boats, square sterned canoes, or other similar craft will be permitted in the water, and no boats will be permitted in the water except in areas designated for boating by the Commission or its designee. Outboard motors shall have a rating of not more than one-half the BIA or OBC rated horsepower for the boat and shall not exceed 20 horsepower, except that outboard motors for Commission boats less than fourteen 14 feet six inches in length shall not exceed ten horsepower. Boats less than 14 feet six inches in length will be limited to three occupants, and boats of that length and in excess thereof may be licensed to carry four occupants. No boats shall carry more than four occupants. Canoes and jon boats of a minimum length of 12 feet, and of a type considered safe by the Commission representative in charge, shall be used and only in areas designated for boating by the Commission on Pottapaug Pond above the regulating dam and at Gate 31 above the regulating dam. Canoes less than 16 feet and jon boats less than 14 feet six inches in length will be limited to two occupants, and canoes and jon boats in excess thereof may be licensed to carry three occupants. All boats must be in compliance with current Commonwealth Boating Laws. All boats must be clean and contain no refuse of any kind. Commission personnel shall have the right to inspect all private boats launched at Commonwealth facilities and may deny access in order to protect water quality or the safety of occupants. Chock blocks must be used on vehicles when removing boats from the Reservoir.

4. No Person shall operate a motor boat at a speed other than reasonable and proper or in such a manner as to annoy or endanger the occupants of other boats.

5. Fishing from the shorelines of the Quabbin Reservoir and its Tributaries within the Watershed System or from boats shall be allowed only during a season designated by

the Commission or its designee. All privately-owned boats, motors and other equipment must be removed from the property of the Commission each day.

6. Boats shall not leave the mooring areas before dawn, and must return at the time posted at each mooring area. The beaching of boats at any point except at the designated mooring and landing areas is strictly prohibited, except in cases of extreme emergency.

(c) Special Regulations for Ware River.

1. Persons in compliance with Commonwealth Fish and Game Laws and Regulations will be allowed to fish in the Ware River in areas designated by the Commission or its designee.

2. Powered boats and powered canoes are prohibited within the Ware River Watershed Reservation.

(d) Special Regulations for Wachusett Reservoir.

1. Persons in compliance with Commonwealth Fish and Game Laws and Regulations will be allowed to fish from the shore of Wachusett Reservoir in areas designated by the Commission or its designee.

2. Boating is prohibited in Wachusett Reservoir.

3. Fishing from the shoreline of the Reservoir shall be allowed only during a season designated by the Commission or its designee.

(e) Special Regulations for Sudbury Reservoir.

1. Persons in compliance with Commonwealth Fish and Game Laws and Regulations will be allowed to fish from the shore of Sudbury Reservoir in areas designated by the Commission or its designee.

2. Boating is prohibited on Sudbury Reservoir except in areas designated by the Commission or its designee.

11.10: Enforcement

Any Person who, without lawful authority, takes or diverts any Waters of the Watershed System or corrupts or defiles any such Waters or any source of such Waters or who violates and refuses to comply with any rule, regulation or order of the Commission shall be subject to the fines set forth in M.G.L. c. 92, § 111. The provisions of 350 CMR 11.00 shall be enforced upon petition of the Commission or of any town or Person interested by the Supreme Judicial Court or Superior Court or any justice of either court as provided in M.G.L. c. 92, § 112. In addition, upon written request by the Division, the Department shall have the authority to enforce the provisions of St. 1992 c. 36 and 350 CMR 11.00 by all legally permitted enforcement mechanisms including, but not limited to: issuing notices of noncompliance; convening pre-enforcement conferences; issuing water supply orders pursuant to M.G.L. c. 111, § 160; and imposing administrative penalties pursuant to M.G.L. c. 21A, § 16 and 310 CMR 5.00. Such written request by the Division to the Department may seek enforcement for a specified type of violation or area, for a designated group of cases or for an individual matter.

11.11: Miscellaneous

(1) Addresses - Offices of Division

Department of Conservation and Recreation
Quabbin Reservoir
485 Ware Road
Belchertown, Massachusetts 01007

Department of Conservation and Recreation
Wachusett Reservoir
P.O. Box 206
Clinton, Massachusetts 01510

(2) Address of Commissioner -

Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, Massachusetts 02114

(3) Address of Department -

Department of Environmental Protection
Commonwealth of Massachusetts
Regional Division
One Winter Street
Boston, Massachusetts 02108

(4) Access to Property by Division - Any Person making a request for Watershed determination of applicability, an application for variance or a request for Exemption to the Division shall, upon request, allow the Division or its duly authorized representatives to inspect the property in question in order to assist the Division in the determination which is to be made. Personnel of the Division may enter, at reasonable times, any property, public or private, for the purpose of investigating or inspecting any condition relating to the discharge or possible discharge of Pollutants into the Watershed System and may make such tests as may be necessary to determine the existence and nature of such discharge as provided in M.G.L. c. 21, § 4.

11.12: Severability

If any provision or any part of 350 CMR 11.00 or the application thereof is held to be invalid, such invalidity shall not affect any other provision of 350 CMR 11.00.

11.13: Forms

Forms for use under the Watershed Protection Act shall be as follows:

Form 1 - Request for Watershed Determination of Applicability

Form 2 - Applicability Decision

Form 3 - Application for Variance

Form 4 - Variance Decision for Recording in Registry of Deeds

Form 5 - Request for Exemption of a Tributary

Forms 1, 3 and 5 and a Guidance Document, which may be of assistance in completing the forms, may be obtained from the Division at the addresses specified in 350 CMR 11.11(1) and (2).

REGULATORY AUTHORITY: 350 CMR 11.00: St. 1992, c. 36.

10.2.3 Watershed Management Plan Legislation

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE XIV. PUBLIC WAYS AND WORKS

CHAPTER 92A1/2. WATERSHED MANAGEMENT

Chapter 92A1/2: Section 16. Periodic watershed management plans

Section 16. The commissioner shall at least once every 5 years, adopt after public hearing one or more periodic watershed management plans for the watershed system, which shall have been prepared with the participation of a professionally qualified forester and the appropriate watershed advisory committee. Any watershed management plan shall provide for, but need not be limited to, forestry, water yield enhancement and recreational activities. All forestry activities shall be subject to sections 40 to 46, inclusive, of chapter 132.

10.2.4 Advisory Committee Legislation

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE XIV. PUBLIC WAYS AND WORKS

CHAPTER 92A1/2. WATERSHED MANAGEMENT

Chapter 92A1/2: Section 13. Quabbin watershed advisory committee

Section 13. The commissioner shall establish the Quabbin watershed advisory committee. The purpose of the committee shall be to advise the division on its policies and regulations regarding fishing, boating and other recreational activities and environmental, wildlife and habitat matters within the Quabbin watershed. The commissioner of the department shall appoint to the advisory committee 1 person from 3 names nominated by each of the following organizations: the Massachusetts Council of Sportsmen, the Trout Unlimited, the Quabbin Fisherman's Association, the Worcester County League of Sportsmen, the North Worcester County Quabbin Anglers, the Massachusetts Audubon Society, the Swift River Valley Historical Society, the Massachusetts Wildlife Federation, the New England Sierra Club, and the Friends of Quabbin, Inc.

The commissioner shall also appoint 1 member from the general public. The committee shall elect a chairperson from among its members, shall meet at least twice each calendar year, and may provide for alternate members to participate fully in its meetings whenever a regular member is unable to do so.

10.2.5 Deer Management Regulations

350 CMR 8.00: LAND WITHIN WATERSHED RESERVATIONS

Section

8.02: Deer Management Program in the Quabbin Reservoir Area

8.02: Deer Management Program in the Quabbin Reservoir Area

(1) Hunting of white-tailed deer shall be allowed in specified sections of the Quabbin Reservoir Area by those persons holding a use permit issued by the Commission or its designee for a controlled deer hunt conducted in conjunction with the Commission's Deer Management Program. All persons to whom such a use permit has been issued are also required to have a valid Massachusetts hunting license issued by the Division of Fisheries and Wildlife.

(2) The use permit will specify the hunting season, the time of day, and the designated location for hunting. Certain sensitive areas shall be designated off limits to permittees. Access to the hunting area shall be by use permit only and shall be for the season, time and designated location only.

(3) No hunting is allowed within direct view of the Quabbin Reservoir shoreline, or within 500 feet of any building, or in other areas posted as no hunt zones. Shooting or injury of any bird or animal species other than white-tailed deer is strictly prohibited.

(4) 321 CMR 3.00 applies to MDC controlled hunt programs. The use of buck shot is prohibited and firearms shall be limited to shotguns only. No cutting of branches, trees or shrubs, or nailing of trees is allowed. All deer carcasses shall be brought to a check station, tagged, and concealed from view before being transported outside of Commission property. In the event of a conflict, 350 CMR 8.00 takes precedence over 321 CMR 3.00.

(5) No litter or refuse of any sort may be thrown or left in or on any land or water within the Quabbin Reservoir Area. Sanitary facilities provided for public use shall be the only locations used for such purposes. No deer parts shall be disposed of within 100 feet of any brook, stream, wetland or other water body. All acts which may pollute the water supply are strictly prohibited. Permittees must obey all other promulgated Rules and Regulations of the Commission while on MDC lands.

(6) All public access, whether pedestrian or by motor vehicle, is restricted to paths and roads specifically designated for use during the hunting season. All vehicle parking must be in designated areas only.

(7) All persons within the Quabbin Reservoir Area shall obey the directions of regulatory signs, instructions contained on the use permit, and directions of police officers, Watershed Division employees, environmental police officers, rangers and enforcement officers.

(8) The selection of participants in the program shall be randomly accomplished. Once selected, applicants must attend a training session, certify that they have not violated M.G.L. c. 131 (Massachusetts Fisheries and Game laws) or M.G.L. c. 92 (Metropolitan District Commission) within the past five years, and pay all requisite fees, including a non-refundable \$5.00 application fee, to participate in the hunting program. Use permits are valid only for the person named in the permit and for the period specified.

(9) Any person who violates or refuses to comply with any of 350 CMR 8.00 may be subject to immediate revocation of the permit, a criminal fine or imprisonment.

(10) The provisions of 350 CMR 8.00 are severable, and if any of them are held to be invalid for any reason or under any circumstance, such holding shall not affect any other rule or regulation.

REGULATORY AUTHORITY

350 CMR 8.00: M.G.L. c. 92, §§ 10 through 19; c. 92, §§ 104 through 120;
St. 1972, c. 737; St. 1990, c. 436.

10.3 Appendix III: Quabbin Flora

Quabbin Flora: Plant Species on Harvesting Lots

NOTE: this table includes species encountered by University of Massachusetts Herbarium staff during a 1995-6 survey of 37 proposed timber harvesting lots at Quabbin. It is not an exhaustive survey of all plants at Quabbin, although most common species as well as many of the less common species are represented. **Rare species are in bold.** *Invasive species are shown with an asterisk. This list is not meant to be comprehensive for the entire watershed, but serves as a starting point for assessing the diversity of plant species present on the Quabbin watershed.

Dicots

<i>Acer pensylvanicum</i>	Striped Maple	<i>Caltha palustris</i>	marsh marigold
<i>Acer rubrum</i>	Red Maple	<i>Cardamine sp.</i>	Bitter cress
<i>Acer saccharum</i>	Sugar Maple	<i>Carpinus caroliniana</i>	iron wood
<i>Achillea millefolium</i>	common yarrow	<i>Carya ovata</i>	shagbark hickory
<i>Actaea pachypoda</i>	doll's eyes	<i>Carya sp.</i>	Hickory
<i>Actaea rubra</i>	red baneberry	<i>Castanea dentata</i>	chestnut
<i>Actaea sp.</i>	Baneberry	* <i>Celastrus orbiculatus</i>	Japanese bittersweet
<i>Alnus incana var. americana</i>	speckled alder	<i>Chelone glabra</i>	hairy turtlehead
<i>Alnus serrulata</i>	common alder	<i>Chimaphila maculata</i>	spotted wintergreen
<i>Amelanchier sp.</i>	Shadbush	<i>Chimaphila umbellata</i>	pipsissewa
<i>Amelanchier sp. (canadensis?)</i>		<i>Chrysanthemum leucanthemum</i>	white daisy
<i>Amphicarpaea bracteata</i>	hog peanut	<i>Chrysosplenium americanum</i>	golden saxifrage
<i>Anemone quinquefolia</i>	wood anemone	<i>Circaea alpina</i>	enchanters nightshade
<i>Anemonella thalictroides</i>	rue anemone	<i>Circaea lutetiana var. canadensis</i>	Canadian en. night.
<i>Antennaria sp.</i>	ladies' tobacco	<i>Clematis virginiana</i>	virgin's bower
<i>Apios americana</i>	groundnut	<i>Collinsonia canadensis</i>	richweed, stoneroot
<i>Apocynum androsaemifolium</i>	spreading dogbane	<i>Comptonia peregrina</i>	sweet fern
<i>Apocynum sp.</i>	Dogbane	<i>Convolvulus sp.</i>	Bindweed
<i>Aquilegia canadensis</i>	wild columbine	<i>Coptis trifolia</i>	goldthread
<i>Aralia nudicaulis</i>	wild sarsaparilla	<i>Cornus alternifolia</i>	alternate-leaf dogwood
<i>Aronia arbutifolia</i>	cherry	<i>Cornus canadensis</i>	bunch berry
<i>Aronia melanocarpa</i>	choke cherry	<i>Cornus racemosa</i>	red panicle dogwood
<i>Asclepius sp.</i>	Milkweed	<i>Cornus stoloniferous</i>	red osier
<i>Asclepius exaltata ?</i>	green milkweed	<i>Corydalis sempervivens</i>	pale corydalis
<i>Aster acuminatus</i>	whorled aster	<i>Corylus americana</i>	American hazelnut
<i>Aster cordifolius</i>	heart-leaved aster	<i>Corylus cornuta</i>	beaked hazelnut
<i>Aster divaricatus</i>	white wood aster	<i>Crataegus sp.</i>	Hawthorn
<i>Aster linariifolius</i>	stiff leaf aster	<i>Dalibarda repens</i>	robin-run-away
<i>Aster sp.</i>	Aster	<i>Diervilla lonicera</i>	bush honeysuckle
<i>Aureolaria pedicularia</i>	downy false foxglove	<i>Epigaea repens</i>	trailing arbutus
* <i>Berberis thunbergii</i>	Japanese barberry	<i>Eupatorium perfoliatum</i>	boneset
* <i>Berberis vulgaris</i>	common barberry	<i>Eupatorium rugosum</i>	white snakeroot
<i>Betula alleghaniensis</i>	yellow birch	<i>Fagus grandifolia</i>	beech
<i>Betula lenta</i>	black birch	<i>Fragaria sp.</i>	Strawberry
<i>Betula papyrifera</i>	white birch	<i>Fraxinus americana</i>	white ash
<i>Betula populifolia</i>	gray birch	<i>Fraxinus pennsylvanica</i>	green ash
<i>Bidens sp.</i>	Bur-Marigold	<i>Fraxinus sp.</i>	Ash
<i>Boehmeria cylindrica</i>	false nettle	<i>Galium lanceolatum</i>	lance-leaved wild licorice

<i>Galium sp.</i>	Bedstraw	<i>Panax trifolius</i>	dwarf ginseng
<i>Galium trifidum</i>	three-cleft bedstraw	<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Gaultheria procumbens</i>	wintergreen	<i>Parthenocissus sp.</i>	Virginia creeper
<i>Gaylussacia baccata</i>	black huckleberry	<i>Plantago sp.</i>	Plantain
<i>Gaylussacia frondosa</i>	dangleberry	<i>Polygala paucifolia</i>	fringed polygala
<i>Gaylussacia sp.</i>	Huckleberry	<i>Polygonum sagittatum</i>	Tearthumb
<i>Geranium maculatum</i>	wild geranium	<i>Populus grandidentata</i>	large-toothed aspen
<i>Gerardia sp.</i>	Gerardia	<i>Populus sp.</i>	Aspen
<i>Geum canadense</i>	Canadian avens	<i>Populus tremuloides</i>	quaking aspen
<i>Glechoma hederacea</i>	ground ivy	<i>Potentilla canadensis</i>	Canadian cinquefoil
<i>Gnaphalium sp.</i>	Cudweed	<i>Potentilla simplex</i>	old-field cinquefoil
<i>Hamamelis virginiana</i>	witch hazel	<i>Potentilla sp.</i>	Cinquefoil
<i>Helianthemum sp.</i>	rockrose	<i>Prenanthes alba</i>	white snake root
<i>Hieracium venosum</i>	rattlesnake weed	<i>Prenanthes sp.</i>	Rattlesnake root
<i>Hedyotis caerulea</i>	bluets	<i>Prenanthes trifoliolata</i>	gall-of-the-earth
<i>Hydrocotyle americana</i>	water-pennywort	<i>Prunella vulgaris</i>	heal all
<i>Hypericum sp.</i>	St. John's wort	<i>Prunus serotina</i>	black cherry
<i>Ilex verticillata</i>	winterberry	<i>Prunus sp.</i>	Cherry
<i>Impatiens capensis</i>	jewelweed	<i>Prunus virginiana</i>	choke cherry
<i>Kalmia angustifolia</i>	sheep laurel	<i>Pyrola elliptica</i>	shinleaf
<i>Kalmia latifolia</i>	mountain laurel	<i>Pyrola rotundifolia</i>	round-leafed pyrola
<i>Lactuca canadensis</i>	wild lettuce	<i>Pyrola sp.</i>	Pyrola
<i>Lespedeza sp.</i>	Bush-clover	<i>Pyrus malus</i>	apple
<i>Lindera benzoin</i>	spicebush	<i>Quercus alba</i>	white oak
* <i>Lonicera sp.</i>	Honeysuckle	<i>Quercus coccinea</i>	scarlet oak
* <i>Lonicera tatarica</i>	tartarian honeysuckle	<i>Quercus ilicifolia</i>	scrub oak
<i>Lycopus sp.</i>	Water horehound	<i>Quercus prinus</i>	chestnut oak
<i>Lyonia ligustrina</i>	maleberry	<i>Quercus rubra</i>	red oak
<i>Lysimachia ciliata</i>	hairy loosestrife	<i>Quercus sp.</i>	Oak
<i>Lysimachia quadrifolia</i>	whorled loosestrife	<i>Quercus velutina</i>	black oak
<i>Lysimachia terrestris</i>	swamp candles	<i>Ranunculus recurvatus</i>	buttercup
<i>Malva neglecta?</i>	common mallow	<i>Ranunculus sp.</i>	Buttercup
<i>Melampyrum lineare</i>	cow wheat	* <i>Rhamnus cathartica</i>	common buckthorn
<i>Mimulus ringens</i>	gaping monkey flower	<i>Rhododendron sp.</i>	Rhododendron, Azalea
<i>Mitchella repens</i>	partridge berry	<i>Rhododendron viscosum</i>	swamp honeysuckle
<i>Moneses uniflora</i>	One-flowered Pyrola	<i>Rhus copallina</i>	Winged sumac
<i>Monotropa hypopithys</i>	pine-sap	<i>Toxicodendron radicans</i>	poison ivy
<i>Monotropa uniflora</i>	Indian-pipe	<i>Rhus typhina</i>	staghorn sumac
<i>Myosotis scorpioides</i>	true forget-me-not	* <i>Rosa multiflora</i>	multiflora rose
<i>Myrica gale</i>	sweet gale, meadow-fern	<i>Rosa rugosa</i>	Rugosa Rose
		<i>Rosa sp.</i>	Rose
<i>Rorippa nasturtium-aquaticum</i>	watercress	<i>Rubus allegheniensis</i>	black raspberry
<i>Nemopanthus mucronatus</i>	mountain holly	<i>Rubus flagellaris</i>	dewberry
<i>Nyssa sylvatica</i>	black gum	<i>Rubus hispidus</i>	swamp dewberry
<i>Orobanche uniflora</i>	one-flowered cancer-root	<i>Rubus idaeus</i>	raspberry
		<i>Rubus sp.</i>	Blackberry
<i>Ostrya virginiana</i>	American hop-hornbeam	<i>Rumex acetocella</i>	sorrel
<i>Oxalis Montana</i>	common wood sorrel	<i>Sambucus canadensis</i>	common elder
<i>Oxalis sp.</i>	Wood sorrel	<i>Sambucus pubens</i>	stinking elder
		<i>Sanguinaria canadensis</i>	bloodroot

<i>Sanicula marilandica</i>	black snakeroot	<i>canadensis</i>	
<i>Sassafras albidum</i>	sassafras	<i>Carex canescens</i>	
<i>Saxifraga pensylvanica</i>	swamp saxifrage	<i>Carex communis</i>	
<i>Scutellaria epilobiifolia</i>	common skullcap	<i>Carex crinita</i>	long-haired sedge
<i>Sedum purpureum</i>	garden orpine	<i>Carex debilis</i>	weak sedge
<i>Senecio aureus</i>	squaw weed	<i>Carex digitalis</i>	finger-like sedge
<i>Solanum dulcamara</i>	nightshade	<i>Carex disperma</i>	two-seeded sedge
<i>Solidago caesia</i>	blue-stem goldenrod	<i>Carex folliculata</i>	follicle-bearing sedge
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	<i>Carex gracillima</i>	slender sedge
	Goldenrod	<i>Carex intumescens</i>	swelled-up sedge
<i>Solidago sp.</i>		<i>Carex laxiflora</i>	loosely-flowered sedge
<i>Sorbus sp.</i>		<i>Carex (laxiflora group)</i>	
<i>Specularia sp.</i>	Venus' looking glass	<i>Carex leptalea</i>	delicate sedge
<i>Spiraea alba var. latifolia</i>	meadowsweet	<i>Carex lurida</i>	sallow sedge
<i>Spiraea sp.</i>	Spiraea	<i>Carex novae-angliae</i>	New England sedge
<i>Spiraea tomentosa</i>	steeple bush	<i>Carex (ovales group)</i>	
<i>Symphoricarpos albus</i>	snowberry	<i>Carex pen/communis</i>	
<i>Taraxacum sp.</i>		<i>Carex pennsylvanica</i>	Penn. sedge
<i>Thalictrum polygamum</i>	tall meadow rue	<i>Carex platyphylla?</i>	broad-leaved sedge
<i>Thalictrum sp.</i>	Meadow rue	<i>Carex sp.</i>	Sedge
<i>Tiarella cordifolia</i>	foam flower	<i>Carex (stellulatae group)</i>	
<i>Tilia americana</i>	basswood	<i>Carex stricta</i>	erect sedge
<i>Trientalis borealis</i>	starflower	<i>Carex stipata</i>	crowded sedge
<i>Ulmus americana</i>	American elm	<i>Carex swanii</i>	Swan sedge
<i>Vaccinium angustifolium</i>	low-bush blueberry	<i>Carex trisperma?</i>	three-seeded sedge
<i>Vaccinium corymbosum</i>	high-bush blueberry	<i>Carex vestita</i>	clothed sedge
<i>Vaccinium macrocarpon</i>	American cranberry	<i>Carex vulpinoidea</i>	foxtail-flowered sedge
<i>Vaccinium sp.</i>	Blueberry	<i>Clintonia borealis</i>	yellow clintonia
<i>Vaccinium pallens</i>	early sweet blueberry	<i>Corallorhiza sp.</i>	coral root
<i>Veronica scutellata</i>	marsh speedwell	<i>Cypripedium acaule</i>	pink lady's slipper
<i>Viburnum acerifolium</i>	maple-leaved viburnum	<i>Danthonia spicata</i>	junegrass
<i>Viburnum alnifolium</i>	hobblebush	<i>Epipactis helleborine</i>	helleborine
<i>Viburnum cassinoides</i>	witherod	<i>Festuca ovina</i>	sheep festcue
<i>Viburnum dentatum var. lucidum</i>	southern arrow wood	<i>Glyceria pallida</i>	pale manna-grass
<i>Viburnum lentago</i>	nannyberry	<i>Glyceria sp.</i>	manna-grass
<i>Viburnum opulus var. americanum</i>	highbush cranberry	<i>Glyceria striata</i>	fowl-meadow grass
<i>Viola conspersa</i>	dog violet	<i>Goodyera pubescens</i>	rattlesnake plantain
<i>Viola cucullata</i>	marsh violet	<i>Goodyera sp.</i>	Plantain
<i>Viola fimbriatula</i>	fringed violet	<i>Goodyera tessellata</i>	checkered rattlesnake plantain
<i>Viola macloskii ?</i>			
<i>Viola sp.</i>	Violet	[Grass species]	
<i>Vitis sp.</i>	Grape	<i>Habenaria bracteata</i>	
<i>Zizia aurea</i>	golden alexander	<i>Habenaria clavellata</i>	green woodland orchis
		<i>Habenaria fimbriata</i>	large purple-fringed orchis
Monocots		<i>Habenaria sp.</i>	Orchis
<i>Anthoxanthum odoratum</i>	sweet vernal grass	<i>Hypoxis hirsuta</i>	stargrass
<i>Arisaema sp.</i>	jack-in-the-pulpit	<i>Iris versicolor</i>	blue flag
<i>Arisaema triphyllum</i>	small jack-in-the-pulpit	<i>Isotria verticillata</i>	large whorled pogonia
<i>Brachyelytrum erectum</i>		<i>Juncus effusus</i>	soft rush
<i>Calamagrostis</i>	blue-joint	<i>Lilium philadelphicum</i>	wood lily

<i>Lilium sp.</i>	Lily
<i>Luzula sp.</i>	Woodrush
<i>Maianthemum canadense</i>	Canada mayflower
<i>Medeola virginiana</i>	Indian cucumber root
<i>Orchid sp.</i>	Orchid
<i>Oryzopsis sp.</i>	rice grass
<i>Panicum latifolium</i>	panic grass
<i>Panicum sp.</i>	panic grass
<i>Polygonatum pubescens</i>	hairy Solomon's seal
<i>Sagittaria sp.</i>	Arrowhead
<i>Scirpus cyperinus</i>	wool sedge
<i>Scirpus expansus</i>	spread-out bulrush
<i>Scirpus sp.</i>	Bulrush
<i>Sisyrinchium sp.</i>	Blue-eyed grass
<i>Smilacina racemosa</i>	false solomon's seal
<i>Smilax herbacea</i>	Jacob's ladder
<i>Smilax rotundifolia</i>	common greenbrier
<i>Symplocarpus foetidus</i>	skunk cabbage
<i>Trillium sp.</i>	Trillium
<i>Trillium undulatum</i>	painted trillium
<i>Typha sp.</i>	Cat-tail
<i>Uvularia perfoliata</i>	bellwort
<i>Uvularia sessilifolia</i>	wild oats
<i>Veratrum viride</i>	false hellebore

Fern Allies

<i>Equisetum sp.</i>	Horsetail
<i>Equisetum arvense</i>	common horsetail
<i>Equisetum sylvaticum</i>	horsetail
<i>Diphasiastrum digitatum</i>	trailing evergreen
<i>Diphasiastrum tristachyum</i>	ground pine
<i>Huperzia lucidula</i>	shiny clubmoss
<i>Lycopodium annotinum</i>	bristly clubmoss
<i>Lycopodium clavatum</i>	common clubmoss
<i>Lycopodium dendroideum</i>	
<i>Lycopodium hickeyi</i>	
<i>Lycopodium obscurum</i>	tree clubmoss

Ferns

<i>Adiantum pedatum</i>	maiden-hair fern
<i>Asplenium platyneuron</i>	
<i>Athyrium filix-femina</i>	lady fern
<i>Athyrium thelypteroides</i>	silvery spleen
<i>Botrychium dissectum</i>	dissected grape fern
<i>Botrychium matricariaefolium?</i>	Matricaria-leaved g.f.
<i>Botrychium multifidum</i>	leathery grape-fern
<i>Botrychium simplex?</i>	simple grape-fern
<i>Botrychium virginianum</i>	rattlesnake fern
<i>Dennstaedtia punctilobula</i>	hay-scented fern

<i>Dryopteris cristata</i>	crested wood fern
<i>Dryopteris intermedia</i>	spinulose wood fern
<i>Dryopteris marginalis</i>	marginal shield fern
<i>Dryopteris spinulosa</i>	spinulose wood fern
<i>Onoclea sensibilis</i>	sensitive fern
<i>Osmunda cinnamomea</i>	cinnamon fern
<i>Osmunda claytoniana</i>	interrupted fern
<i>Osmunda regalis</i>	royal fern
<i>Polypodium virginianum</i>	rock polypody
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Pteridium aquilinum</i>	bracken fern
<i>Thelypteris noveboracensis</i>	New York fern
<i>Thelypteris palustris</i>	marsh fern
<i>Thelypteris phagopteris</i>	beech fern
<i>Thelypteris simulata</i>	Massachusetts fern

Gymnosperms

<i>Juniperus communis</i>	common juniper
<i>Juniperis virginiana</i>	red cedar
<i>Picea glauca</i>	white spruce
<i>Picea rubens</i>	red spruce
<i>Pinus banksiana</i>	Jack pine
<i>Pinus resinosa</i>	red pine
<i>Pinus rigida</i>	pitch pine
<i>Pinus strobus</i>	white pine
<i>Taxus canadensis</i>	American yew
<i>Tsuga canadensis</i>	hemlock

10.4 Appendix IV: 2004 Quabbin Regeneration Summary Report

Quabbin Forest Regeneration Sampling - Brief History

Past efforts: We have been systematically monitoring regeneration at Quabbin since 1988. Our main method includes milacre (1/1,000th acre) circular plots taken every 200 feet along randomly selected E-W or N-S transects. This is technically *two-stage (transects and sampling points along transects) cluster sampling with uneven-sized clusters (transects are of varying lengths)*. During the period from 1989 through 1996, we conducted watershed-wide sampling, retrieving data from all blocks and all forest types / conditions. We expanded the number of transects in 1996, in a successful effort to reduce the standard error associated with these data. Because regeneration numbers and species distribution are changing gradually, we moved from an annual survey of all areas to a rotation, between 1997 and 2003. In full watershed surveys, we collect information from approximately 2,000 plots requiring the foresters to walk total distances in excess of 100 miles.

Following is a summary of our efforts:

1988: Preliminary sampling on a selection of CFI plots

1989: 796 plots from transects throughout the Quabbin properties

1991 to 1996: Regeneration surveys completed for all blocks each year except 1992; in 1996, 50 transects were sampled, yielding 1,808 forested plots (plots that fell on roads, in wetlands, etc. were not analyzed)

1997: Surveyed all on-Reservation plots for Prescott and New Salem and all off-Reservation plots on all blocks.

1998: Surveyed all on-Reservation plots in Pelham, Hardwick, and New Salem

1999: Surveyed all on-Reservation plots in Petersham and Prescott

2000-2001: Completed the decadal remeasurement of our 300+ 1/5th acre Continuous Forest Inventory plots, including 10 milacre regeneration plots per CFI plot

2001-2002: Surveyed all on-Reservation plots on Prescott and Pelham

2003: Due to staff reductions, reorganization, green certification, and other extenuating circumstances, we did not complete regeneration transects

2004: Full watershed survey conducted, sampling from 1,946 milacre plots distributed across 50 transects of varying widths, covering all blocks and areas both within and outside of the Reservation

In addition to the above, we have conducted browsing surveys on sprout areas produced by cutting of small diameter hardwoods. For these surveys, we count up to 100 twigs/buds per clump, noting whether they are browsed or intact. Results of these browsing surveys are highly variable. The recent increase in the moose population is further confounding regeneration transects and browsing surveys.

A summary report for regeneration and browsing surveys was produced in 1997 to inform the discussion of the next phase of deer impact control. The results showed dramatic increases in the overall growth and development of regeneration as a result of deer reduction, but some continuing disappointments in species distribution; in particular the predominance of two species – white pine and black birch – versus a much more balanced species distribution in off-Reservation areas where hunting has been continuous.

2004 effort: The Natural Resources and Quabbin Section Forestry staffs designed and completed a watershed-wide regeneration survey in 2004. This comprehensive survey was required to address several concerns, including the need to better understand why the deer hunt was so unusually productive in Petersham in 2003, the need to continue to monitor progress in both numbers and species composition, and the need to benchmark the status of regeneration as the moose population begins to have an effect on our forest.

For 2004, we laid out 50 transects, designed to sample both on and off-Reservation in all five blocks. These lines included 16 new transects randomly selected from within the strata that includes harvesting that occurred within the past 3 to 7 years (the time period during which we expect regeneration to begin to appear on harvested lots), and 34 transects that were measured in 1996 and subsequent years. Transect length ranged from approximately ½ mile to just shy of 5 miles. In the past, we identified plots as either light-limited, sufficiently open to establish regeneration, or sufficiently open to allow regeneration to grow and develop. In response to some concern about the subjectivity of our determination of light levels, we dropped this measurement from our plot data collection in 2004. Mean values are derived by block and general forest overstory type, mixing all light levels. We have regrouped and analyzed the 1989 and 1994 data in the same manner to enable a direct comparison of these data sets. (NOTE: A map of the 2004 transects is included at the back of this document for reference.)

The 2004 sample included 156 plots outside the reservation and 1,790 within the reservation. The sample size off-Reservation was small, meant simply to confirm previous findings from continuously hunted areas. Based on the simple comparison in **Table 1**, the areas within the Reservation now contain generally higher regeneration numbers than off-Reservation, except that sapling sized regeneration (defined as trees 1” to 5.5” in diameter at breast height) is still about twice as abundant off-Reservation. This discrepancy is likely to become less pronounced as the on-Reservation regeneration grows older, gradually increasing in size and falling in total numbers due to competition and stem exclusion. Both on and off-Reservation areas currently support in excess of 1,300 stems per acre greater than 4.5 feet in height. (Note that the 1989 regeneration target of 2,000 stems per acre greater than 4.5 feet tall was based exclusively on plots designated as “disturbed”, in which regeneration numbers are higher.)

Table 1: 2004 Comparison Off versus On Reservation

Location	Data	Per Acre
Off Reservation	Average of Tot >1<4.5	2,071
	Average of Tot >4.5<sap	776
	Average of Tot sap	628
	<i>Average all sizes</i>	<i>3,474</i>
On Reservation	Average of Tot >1<4.5	3,187
	Average of Tot >4.5<sap	1,008
	Average of Tot sap	336
	<i>Average all sizes</i>	<i>4,532</i>
Total Average of Tot >1<4.5		3,098
Total Average of Tot >4.5<sap		990
Total Average of Tot sap		359
<i>Average all sizes</i>		<i>4,447</i>

Table 2: 2004 Regeneration Summary By Block

Block	Data	Off Res	On Res	Combined
Pelham	Average of Tot >1<4.5	1,122	2,102	1,962
	Average of Tot >4.5<sap	735	542	570
	Average of Tot sap	755	359	416
	Average of Tot >4.5	1,490	902	985
	Average of Tot all	2,612	3,003	2,948
Hardwick	Average of Tot >1<4.5	3,000	2,634	2,653
	Average of Tot >4.5<sap	433	950	914
	Average of Tot sap	167	283	274
	Average of Tot >4.5	600	1,233	1,188
	Average of Tot all	3,600	3,867	3,841
Prescott	Average of Tot >1<4.5	-	3,267	3,267
	Average of Tot >4.5<sap	-	1,054	1,054
	Average of Tot sap	-	277	277
	Average of Tot >4.5	-	1,331	1,331
	Average of Tot all	-	4,597	4,597
New Salem	Average of Tot >1<4.5	1,733	3,399	3,012
	Average of Tot >4.5<sap	1,067	460	601
	Average of Tot sap	717	490	543
	Average of Tot >4.5	1,783	949	1,143
	Average of Tot all	3,517	4,348	4,155
Petersham	Average of Tot >1<4.5	4,353	4,441	4,438
	Average of Tot >4.5<sap	471	1,668	1,616
	Average of Tot sap	765	375	392
	Average of Tot >4.5	1,235	2,043	2,008
	Average of Tot all	5,588	6,484	6,445
Total Average of Tot >1<4.5		2,071	3,187	3,096
Total Average of Tot >4.5<sap		776	1,008	989
Total Average of Tot sap		628	336	359
Total Average of Tot >4.5		1,404	1,344	1,348
Total Average of Tot all		3,474	4,532	4,445

There are some interesting differences in the regeneration conditions among the five administrative Blocks at Quabbin, shown in Table 2 above and Table 3 below. Within the Reservation, Pelham continues to yield the lowest mean values for regeneration, with 902 stems per acre above 4.5 feet, and just over 3,000 total. On-Reservation sites in Petersham, on the other hand, contain 2,043 stems above 4.5 feet, and 6,484 stems of all sizes, per acre, on average. The largest *changes* in these values have been on Prescott Peninsula, where deer pressure was at its highest in estimates during the years just prior to the first MDC deer hunt. There was virtually no regeneration greater than one foot in height on large areas of the Peninsula in 1989. In 1996, on disturbed plots, there were 1,677 stems per acre above 1 foot in height, and just 81 stems greater than 4.5 feet in height, on average, on the Peninsula. By 2004, these numbers have changed dramatically, with an average of 4,597 stems per acre greater than 1 foot, of which 1,331 were greater than 4.5 feet. These changes are summarized in Table 3 and accompanying graphics below.

Table 3: Comparison of averages, 1989, 1994, 2004

Block	Year	1' to 4.5'	> 4.5'	TOTAL
Off Reservation	1989	1,960 /acre	1,140 /acre	3,100 /acre
	1994	2,750	1,840	4,590
	2004	2,071	1,404	3,475
On Reservation	1989	770	130	910
	1994	2,955	417	3,372
	2004	3,187	1,344	4,531
Hardwick	1994	1,840	581	2,421
	2004	2,634	1,333	3,967
New Salem	1994	3,846	212	4,058
	2004	3,399	950	4,349
Pelham	1994	930	71	1,001
	2004	2,102	901	3,001
Petersham	1994	4,369	1,054	5,423
	2004	4,438	2,008	6,446
Prescott	1994	3,789	167	3,956
	2004	3,267	1,331	4,598

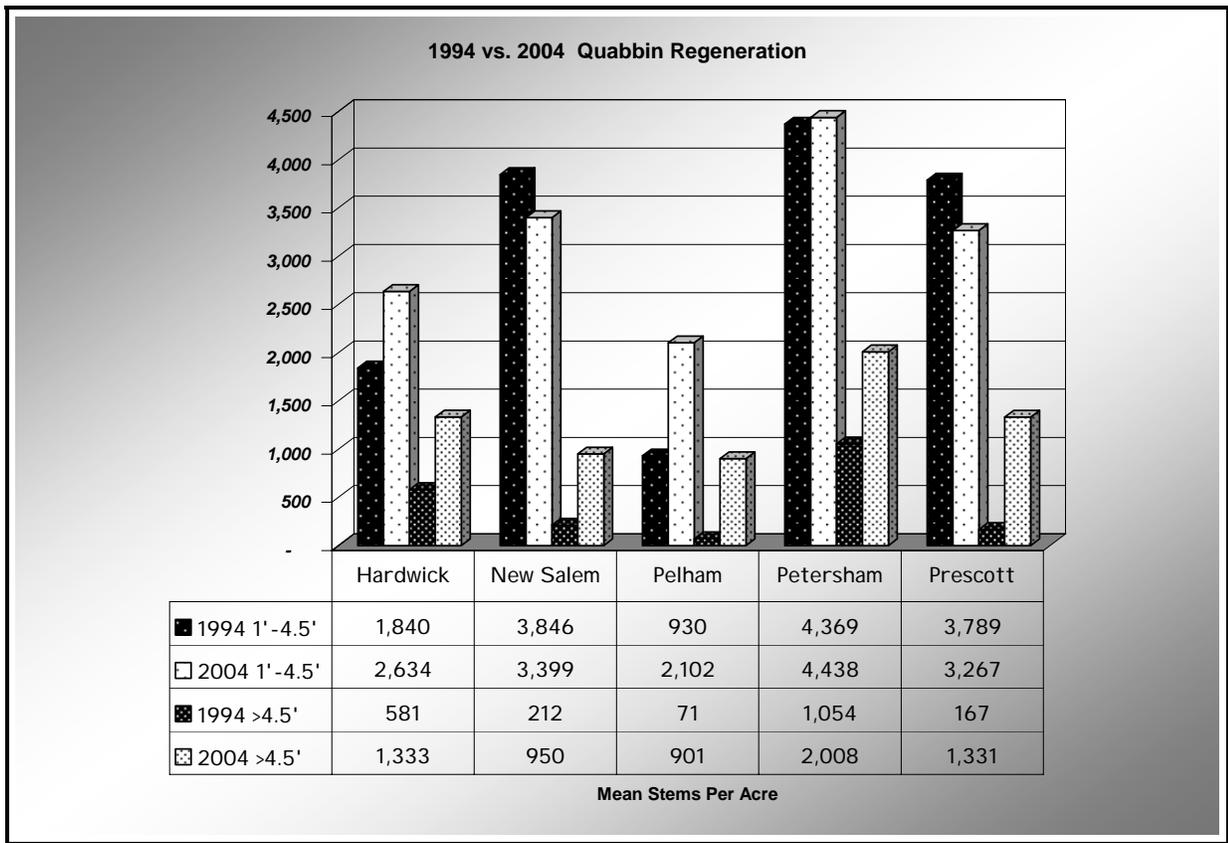


Table 4: Species comparison

Off Reservation	Block					Total	Total
	Pelham	Hardwick	Prescott	New Salem	Petersham	By Size	All sizes
WP > 1 foot	224	767	-	483	2,294	654	-
WP > 4.5 feet	102	33	-	533	235	269	-
WP Sapling	61	33	-	133	588	141	1,064
HK > 1 foot	122	-	-	400	59	199	-
HK >4.5	20	-	-	133	-	58	-
HK Sap	61	-	-	183	-	90	346
BIR >1	20	33	-	333	294	173	-
BIR >4.5	184	100	-	200	59	160	-
BIR Sap	143	67	-	233	59	154	487
MAP >1	61	933	-	183	588	333	-
MAP >4.5	122	133	-	33	59	83	-
MAP Sap	163	33	-	50	118	90	506
OAK >1	327	400	-	150	647	308	-
OAK >4.5	20	33	-	-	59	19	-
OAK Sap	-	33	-	-	-	6	333
ASH >1	-	167	-	17	118	51	-
ASH >4.5	-	33	-	-	59	13	-
ASH Sap	-	-	-	33	-	13	77
OTH > 1	367	700	-	167	353	353	-
OTH >4.5	286	100	-	167	-	173	-
OTH Sap	327	-	-	83	-	135	660
Tot >1<4.5	1,122	3,000	-	1,733	4,353	2,071	-
Tot >4.5<sap	735	433	-	1,067	471	776	-
Tot sap	755	167	-	717	765	628	-
Tot all	2,612	3,600	-	3,517	5,588	3,474	-
On Reservation	-	-	-	-	-	-	-
WP > 1 foot	959	929	1,353	1,884	1,976	1,378	-
WP > 4.5 feet	224	458	385	263	854	461	-
WP Sapling	173	64	88	247	176	132	1,971
HK > 1 foot	115	64	64	359	136	120	-
HK >4.5	27	12	8	25	5	13	-
HK Sap	7	10	-	86	-	13	146
BIR >1	319	399	311	409	500	383	-
BIR >4.5	115	221	317	116	463	269	-
BIR Sap	44	62	78	71	53	63	715
MAP >1	261	264	397	465	691	413	-
MAP >4.5	51	59	68	25	157	77	-
MAP Sap	68	62	62	30	88	65	554
OAK >1	220	561	631	197	899	555	-
OAK >4.5	3	55	54	5	80	46	-
OAK Sap	-	7	4	5	16	7	608
ASH >1	27	67	212	25	82	99	-
ASH >4.5	3	12	44	5	24	21	-
ASH Sap	-	12	4	-	8	6	126
OTH > 1	200	352	299	61	157	239	-
OTH >4.5	119	133	178	20	85	121	-
OTH Sap	68	67	40	51	35	51	410
Tot >1<4.5	2,102	2,634	3,267	3,399	4,441	3,187	-
Tot >4.5<sap	542	950	1,054	460	1,668	1,008	-
Tot sap	359	283	277	490	375	336	-
Tot all	3,003	3,867	4,597	4,348	6,484	4,532	-

Quabbin Park has been excluded from the Quabbin deer hunt due to heavy recreational uses in this area. We ran two transects through Quabbin Park in 2004, collecting data from 75 plots. These lines and plots were run through the managed area of the Park, and deliberately placed to intersect areas harvested in the last 5-12 years. Consequently, these figures do not represent the western areas of the Park, which fall within the Areas with Special Management Restrictions. Table 5 summarizes the averages for these plots. Overall, regeneration greater than 4.5 feet is similar in number to other areas within the Reservation. However, 88% of this regeneration is white pine. Furthermore, only 3 plots out of 75 had *any* white pine regeneration greater than 4.5 feet tall; the high mean is the result of two plots, which had 48 and 33 stems of white pine greater than 4.5 feet. Regeneration from one foot tall to 4.5 feet tall totals just 716 stems, on average, which is only 22.5% of the average for the Reservation as a whole, and only 12% of the plots had *any* white pine regeneration in this class. While white pine seems to be able to make it in limited areas, there is extremely poor success by any other species in getting to and above 4.5 feet (the deer browse level).

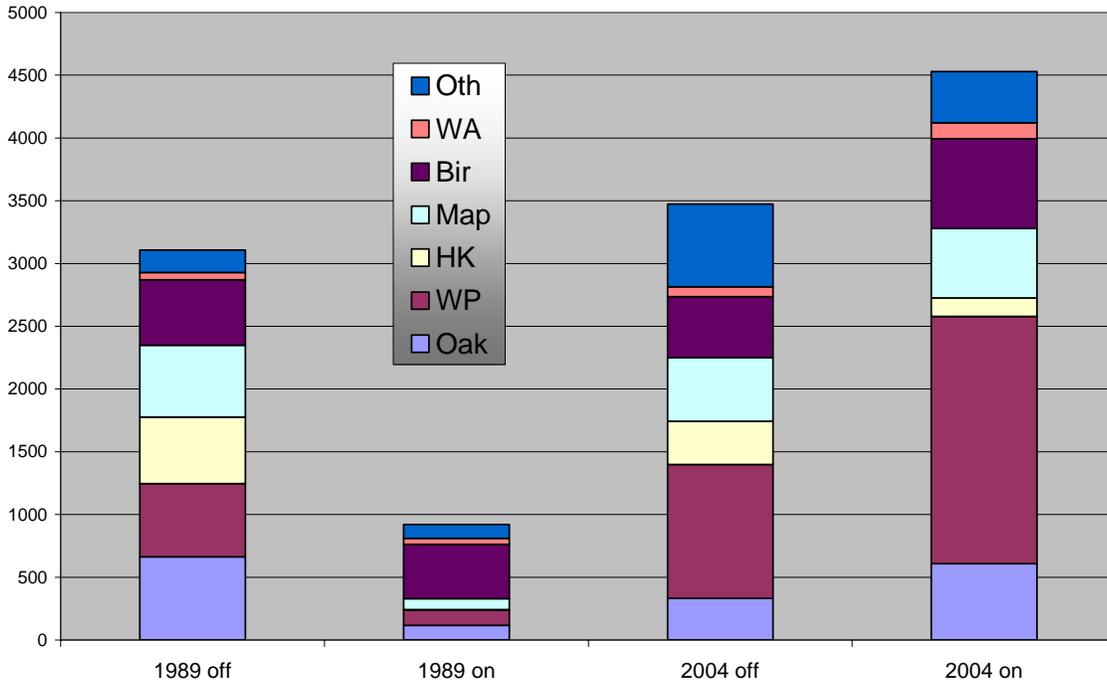
Table 5: Quabbin Park averages

Data	Per Acre Average
WP >1	405
WP >4.5	1,189
WP Saplings	162
HK >1	-
HK >4.5	-
HK Saplings	-
BIRCH >1	14
BIRCH >4.5	-
BIRCH Saplings	-
MAPLE >1	27
MAPLE >4.5	14
MAPLE Saplings	27
OAK >1	270
OAK >4.5	14
OAK Saplings	-
ASH >1	-
ASH >4.5	-
ASH Saplings	27
OTHER > 1	-
OTHER >4.5	54
OTHER Saplings	54
Total > 1	716
Total >4.5	1,271
Total Saplings	270
Total All Sizes	2,257

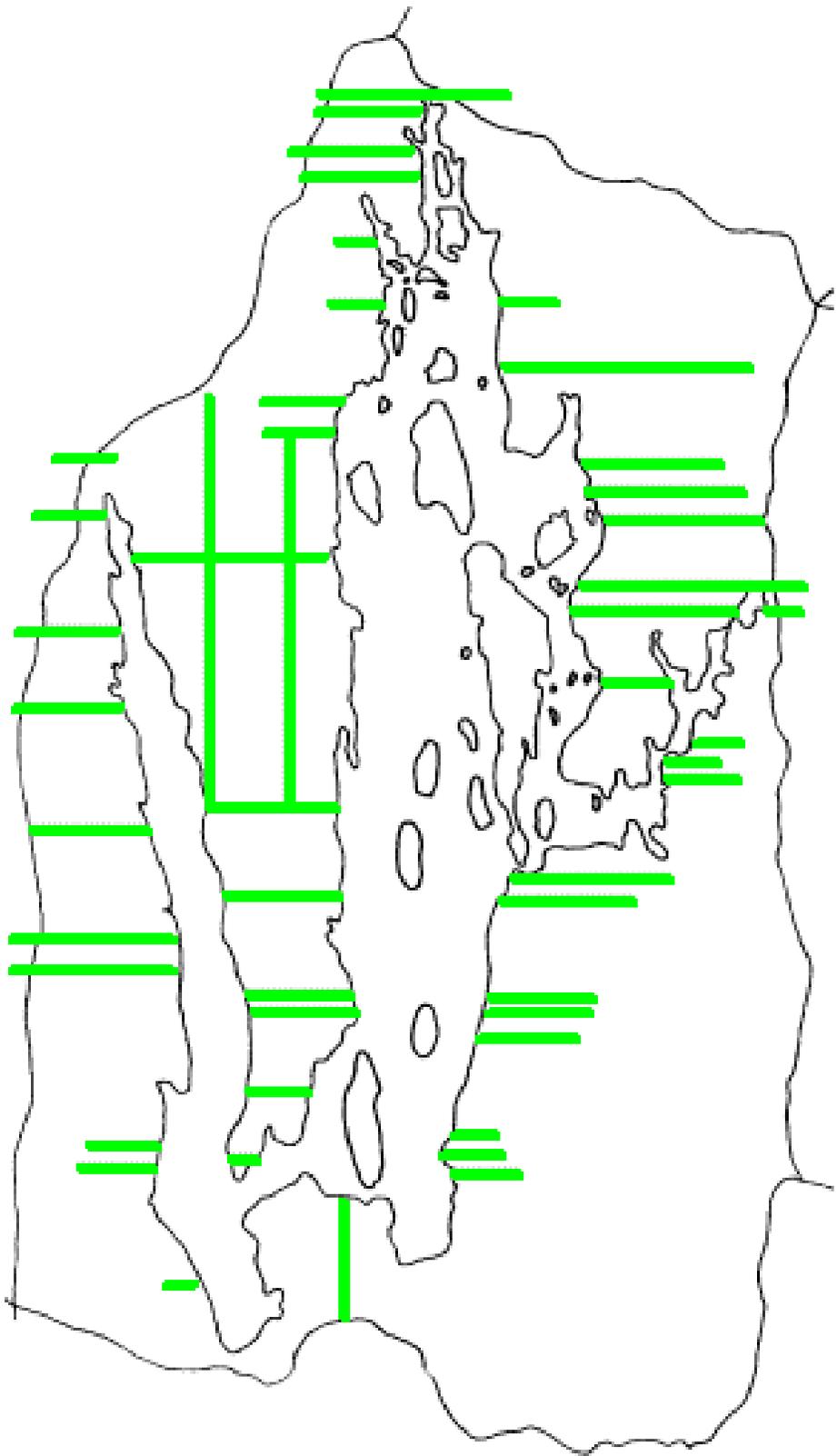
Summary Conclusions:

1. Overall, tree regeneration within the “Reservation” has made a remarkable recovery from the exceptionally low averages in 1989 (total combined average for all sizes was just 910 stems per acre) to those in the most recent, 2004 inventory (combined average 4,532, a 500% increase).
2. The average total number of stems of regeneration within the Reservation (4,532 per acre) is now greater than in areas that have been continuously hunted off-Reservation (current average 3,475 stems per acre). However, the vast majority of the extra numbers within the Reservation are in the 1 foot to 4.5 foot category, and there are twice as many saplings (stems 1” to 5.5” diameter at breast height) off-Reservation. This is indicative of the recovery from a long-term suppression of regeneration. In off-Reservation areas where regeneration has not been suppressed, the size-class distribution of regeneration follows a typical pattern, with a gradual decline in the numbers in each age/size cohort due to stem exclusion. Within the Reservation, there remains a bubble in the youngest age/size class and the numbers in the sapling size as the older classes are still catching up after decades of not being replaced.
3. While regeneration within the Reservation in the Pelham block is the lowest of all block averages, it is very close to the overall average for off-Reservation areas (3,003 stems in Pelham versus 3,474 for off-Reservation areas). Within the Reservation, the average number of stems in the sapling class ranges from 277 per acre on Prescott to 490 in New Salem, versus an off-Reservation average of 628. Petersham is currently carrying the highest overall regeneration both on and off-Reservation, with averages of 5,588 stems per acre off-Reservation and 6,484 stems per acre on-Reservation.
4. In the 1989 regeneration report, regeneration greater than 4.5 feet across all light/disturbance levels averaged 1,140 stems per acre off-Reservation and just 130 stems per acre within the Reservation. In 2004, the average in this size class was 1,404 in off-Reservation areas and 1,344 in all areas within the Reservation, including 628 and 336 stems, respectively, in the 1” to 5.5” dbh “sapling” category, which was not included in the 1989 data. As indicated above, while these total numbers for regeneration greater than 4.5 feet in height are now very similar for both on and off-Reservation areas, they differ in that on-Reservation areas average about 200 more stems in the 4.5 foot tall to 1” inch dbh class, and about 300 fewer stems in the larger, 1” to 5.5” size class.
5. Quabbin Park, to the extent that it was surveyed in 2004, contains very little regeneration other than white pine. While very high values for white pine on a few plots skewed the average, the vast majority of plots in the Park contained no tree regeneration of any species.
6. Species composition across the Reservation, in addition to overall volume of regeneration, has changed dramatically since 1989. White pine continues to dominate all other species, both within and outside the Reservation. Black birch is the second most common species within the Reservation, although most other species inside are now approaching or exceeding the numbers outside the Reservation. There were almost twice as many oaks and white ash inside as there were outside the Reservation in 2004. Hemlock regeneration on the inside, nearly absent in the 1989 measurement, was almost half the average value on the outside. In 1989, maples were scarce inside the Reservation, but are now approximately the same inside and out. The following charts provide details of changes in both composition and average numbers of stems for 1989 versus 2004.

Species Composition and Averages 1989 vs 2004



	Oak	WP	HK	Maples	Birches	WA	Other
1989 off Res	663	584	530	573	521	58	179
1989 on Res	116	124	1	87	433	48	111
2004 off Res	333	1064	346	506	487	77	660
2004 on Res	608	1971	146	554	715	126	410



2004
Regeneration
Transects

10.5 Appendix V: Technical Assistance to Communities: Projects 1994-2006

DIRECT TECHNICAL ASSISTANCE PROVIDED TO QUABBIN & WARE RIVER WATERSHED TOWNS BY THE QUABBIN ENVIRONMENTAL PLANNING SECTION STAFF: 1994-2006

Note: Projects in bolded text are ongoing as of 9/21/06.

All Towns

- Zoning Reform Working Group (model state statutes and educational materials for all towns)
- **Summary of Selected Growth Management Tools** (guidebook for all planning boards)
- **Housing and Land Use in Central Massachusetts** (research publication of regional interest)
- Location of Road Rights-of-Way (model subdivision regulation sent to all towns)
- Citizen Planner Training Collaborative (ANR and growth management workshops)
- Periodic informational mailings to all watershed planning boards
- **Research and development of list service for watershed land use boards (BI, PB, CC BOH, ZBA)**

Shutesbury, MA (many models developed here and adapted for use in other watershed towns)

- Lake Wyola drainage designs (w/ EQ Section)
- Subdivision Control Regulations revisions (new sections)
- Town-wide Rate of Development Bylaw (original)
- Back-Lot Bylaw (adapted from Buckland, MA model)
- Cell Tower Bylaw (from various models)
- Town Center Study (Conway School of Landscape Design)
- Advice to Zoning Board of Appeals, Planning Board and Building Inspector
- Project review and recommendations to Planning Board, Zoning Board of Appeals, and Building Inspector
- **Technical review of zoning revisions (work performed by outside consultant)**

Petersham, MA

- Subdivision Control Regulations (full set)
- **Subdivision Control Regulations (revised full set)**
- Town-wide Rate of Development Bylaw (from Shutesbury, MA model)
- Gravel Removal Bylaw (from MDC model)
- Advice to Planning Board and Master Plan Subcommittee (implementation element of master plan)
- Proposed zoning amendments (review and recommendations)

Phillipston, MA

- Subdivision Control Regulations (review, recommendations)
- Subdivision Control Regulations (developed full set of new regulations)
- Gravel Removal Bylaw (from MDC model)
- General advice to Planning Board
- Project review and recommendations

Templeton, MA

- Advice to Conservation Commission and Building Inspector

Hubbardston, MA

- Town-wide Rate of Development Bylaw (from Shutesbury, MA model and others, editing)
- Town-wide Rate of Development Bylaw (revisions after Zuckerman v. Hadley SJC decision)
- Review of existing master plan
- Subdivision Control Regulations (provided models from Shutesbury, MA)
- Advice to Planning Board, Building Inspector and Open Space Committee
- Project review and recommendations

- Aquifer Protection Bylaw (provided model bylaw)
- Public Informational Program on Land Planning and Open Space Protection (organized)
- Review and recommendations on proposed open space development bylaw

Rutland, MA

- Advice to Planning Board, Master Plan Subcommittee, Conservation Commission, and Building Inspector
- Project review (various large residential subdivisions)
- Open Space Design Bylaw (drafted original bylaw, revisions)
- Subdivision Control Regulations (new sections to old version, original and Shutesbury, MA model language and editing of new version)
- Major Home Occupation Bylaw (w/ CMPRC)
- Growth Management Bylaw (Shutesbury, MA model language, editing)
- Sign Bylaw (editing)
- 1997 Community Survey (original)
- Open Space Site Design Studio (supervised Conway School students)
- Demond Pond Lake Association (w/ EQ Section)
- Wetland Protection Bylaw (provided model bylaw)
- Scoping of shared driveway bylaws
- Town Center Mapping (produced USGS and ortho-photos for Rutland EDIC)
- GIS mapping of proposed sewer district (adopted 5/13/06)

Oakham, MA

- Project review and recommendations to Planning Board
- General advice to Planning Board
- Rural Conservation Overlay District Bylaw (model for consideration)
- Subdivision Regulations (model for consideration adapted from Rutland, MA model)

Princeton, MA

- Open Space Development Bylaw (writing and editing)
- Major Home Occupation Bylaw (provided model bylaw)
- Footprint Roads Pilot Program (provided information)

Barre, MA

- Scoping of potential technical assistance projects
- **Subdivision Control Regulations (add environmental standards to existing regulations)**

New Salem, MA

- Consulted with PB regarding roadway standards in subdivision regulations (provided model)

Wendell, MA

- **Assist with Smart Growth Technical Assistance Grant application (to study and develop forest conservation zoning)**

Pelham, MA

- **Assist with Smart Growth Technical Assistance Grant application (to study and develop forest conservation zoning)**

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