2017

Surrenden Farm Resource Management Plan

Eastern Bluebird Groton, Massachusetts

Groton Conservation Commission

1/27/2017

Contents

INTRODUCTION - EXECUTIVE SUMMARY

Name of Property: **Surrenden Farm**
Size: **159.6 Acres**

> The sojourner in other lands returns with pleasure to this delightful country road and to the westward looks across the valley of the Nashua to the extended horizon of distant mountains. Monadnock, Watatic and Wachusett dominate the view, but the "woods and templed hills" of various points around, all go to make up a picture upon which the eyes, tired of other scenes, seem to rest. It is a glorious prospect and restful in the softness of the outline and one that has made an impress upon all who have lived in this part of the good old town of Groton.

From *The Community – Groton, Massachusetts – The Story of a Neighborhood* by Edward Adams Richardson 1911

Groton Assessors' **Map & Parcels 219-8 and 220-35**
Location: **Shirley Road, Groton, Massachusetts, Middlesex County**

Fee Ownership: Town of Groton, oversight by the Groton Conservation Commission; Conservation Restriction held by the Massachusetts Division of Fisheries & Wildlife.

Description of Property: The property consists of about 159.6 acres of a mixture of open fields and woodlands, wetland resource areas, and riverfront area associated with the Nashua River. About 123 acres of this property are comprised of northern mixed forest containing white pine, hemlock, red oak, red maple, and other northern forest tree species, while the remaining 36 acres are open fields historically used for the cultivation and harvest of hay. Except for the active hay fields, Surrenden Farm falls within Priority Habitat of Rare Species and within BioMap Core Habitat for a number of state-listed species. There is approximately one-third of a mile of frontage on Shirley Road. Including the peninsula that belongs to the Groton Water Department there is almost a mile of shore frontage forming a substantial greenway buffer to the banks of the Nashua River and connecting northerly to an additional 1.5 miles of preserved river greenway.

Estimated Resource Areas	Acreage
Forest	123
Upper hayfield	30
Wetlands (overlaps w/fields & forest)	5.5
Grassland habitat (floodplain) Upper hayfield (southwest field)	11

Mission Statement: To maintain sustainable agricultural and forestry activities through best management practices, maintain and enhance ecologically sensitive and increasingly rare habitats for native fish, wildlife, and plant species, provide a high quality outdoor experience to passive recreational users, protect and promote watershed and public water supply values, and enhance environmental education opportunities for the public.

Management Plan Requirement: In order to meet the obligations of the Conservation Restriction (recorded in the Middlesex South Registry of Deeds in Book 48698, Pages 258-295), a management plan for the property must be completed. This Resource Management Plan is intended to establish guidelines for cooperation and coordinated management of the property that

will provide for the protection and stewardship of natural and cultural resources, and ensure consistency among agricultural, recreational, resource protection, and forestry uses. Upon execution of the Groton Memorial Town Forest Conservation Restriction, this Resource Management Plan will be expanded to incorporate additional management goals and objectives as deemed necessary. While the land is permanently protected from future development, this Resource Management Plan will serve as a living document that can evolve with changing times and conservation needs. The Plan will be re-visited and revised as needed every five years.

Management Principles

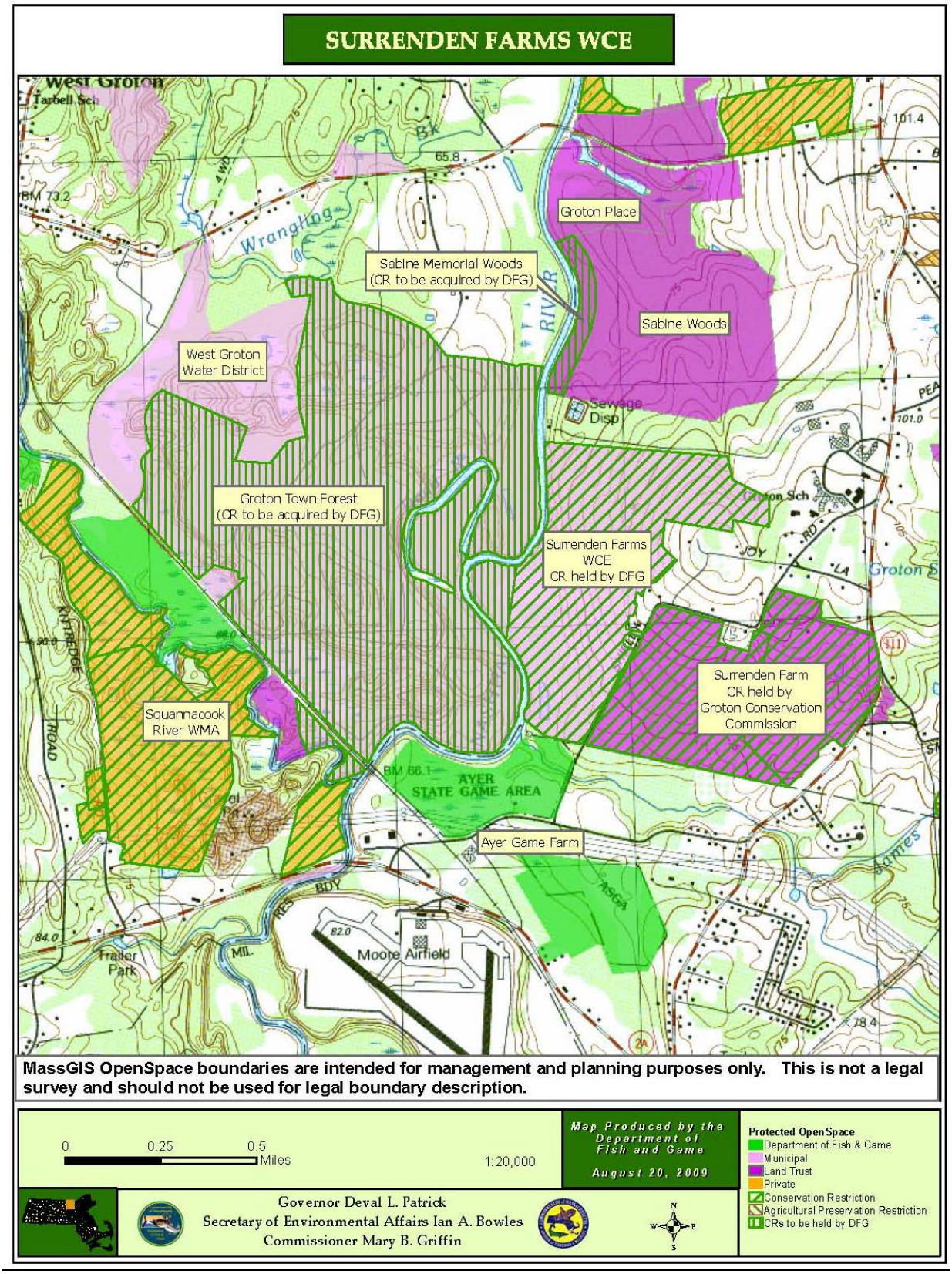
- No commercial use, with the exception of sustainable agricultural and forestry uses and water supply purposes.
- Manage the natural, agricultural, and cultural resources in a sustainable way through good stewardship methods and practices to preserve the land in its historic and/or current state for future generations to enjoy.
- No vehicular access except for fire, rescue, approved habitat management, wildlife and plant research and survey, and approved maintenance purposes.
- Public access will be conducted in a manner consistent with good habitat management practices for the protection of rare and endangered species.
- Recreational activities will be monitored and managed to ensure public safety and sustainability related to stewardship of the resources, both natural and cultural.
- Preserve and enhance hunting and fishing opportunities.
- Educational and research efforts will be supported.
- The Town of Groton and the State, through their designated agents, will maintain good communications and share information and cooperate in the protection, enhancement, and management of the property.
- Identify, preserve, and protect rare and endangered species through the preservation of natural habitat.
- Identify, preserve, and protect cultural resources in accordance with State and Federal regulations and guidelines.
- Protection of water quality in vernal pools and as a potential public well site.
- Management of sport species which may include stocking.
- Control of invasive, non-native species to encourage and preserve biodiversity on the site.

Landscape Context: In recognition of the abundant natural and cultural resources in the region, then Secretary of the Executive Office of Environmental Affairs, Robert Durand, designated two Areas of Critical Environmental Concern (ACECs) in December 2002 that encompass about 80% of the Town of Groton. The east side of the Nashua River falls within the Petapawag ACEC (25,630 acres in Ayer, Dunstable, Groton, Pepperell, and Tyngsborough) while the west side is identified as the Squannassit ACEC (37,450 acres in Ashby, Ayer, Groton, Harvard, Lancaster, Lunenburg, Pepperell, Shirley, and Townsend). Surrenden Farm falls within the Petapawag ACEC.

The 159.65-acre parcel is adjacent to or close by a large amount of already protected conservation land, including the 513-acre Groton Memorial Town Forest and 100-acre Blood parcel recently purchased by the West Groton Water District on the west side of the Nashua River and, on the east side of the River to the north of this parcel, 285 acres of conservation-

restricted or fee-owned land protected by the Groton Conservation Trust, a 190-acre parcel owned by the New England Forestry Foundation, 80 acres owned by the Town of Groton, and 130 acres owned by the MA Department of Fish & Game. Combined with the parcel and the other protected land on Surrenden Farm, these protected lands form a contiguous 1,625-acre block of undeveloped wooded upland, riparian habitat, and farm fields with more than 2½ miles of frontage on the Nashua River.

Map 1 – Landscape Context, Surrenden Farm



Easements:

- The American Telephone & Telegraph Co. (AT & T) has a 16.5 ft. wide easement for a buried cable which also underlies the Nashua River. The cable easement runs west from Shirley Road to the Nashua River. When it reaches Shirley Road the cable is located within the Shirley Road right-of-way. Warning signs are posted along the length of the cable installation.
- Slightly to the north and paralleling the AT & T easement is a 20 ft. wide Groton Water Department easement that runs west from Shirley Road to the Nashua River and then northwest by the shore line 321 ft. to the 10-acre Groton Water Department peninsula. Approximately half of this access easement is within 100-year floodplain.

Management Goals and Objectives

- Balance multiple uses of property (not necessarily in order of priority)
  - farming
  - fishing
  - forestry
  - hiking
  - horseback riding
  - hunting
  - mountain biking
  - nature study
  - water resource protection
  - wildlife management and research
  - winter activities

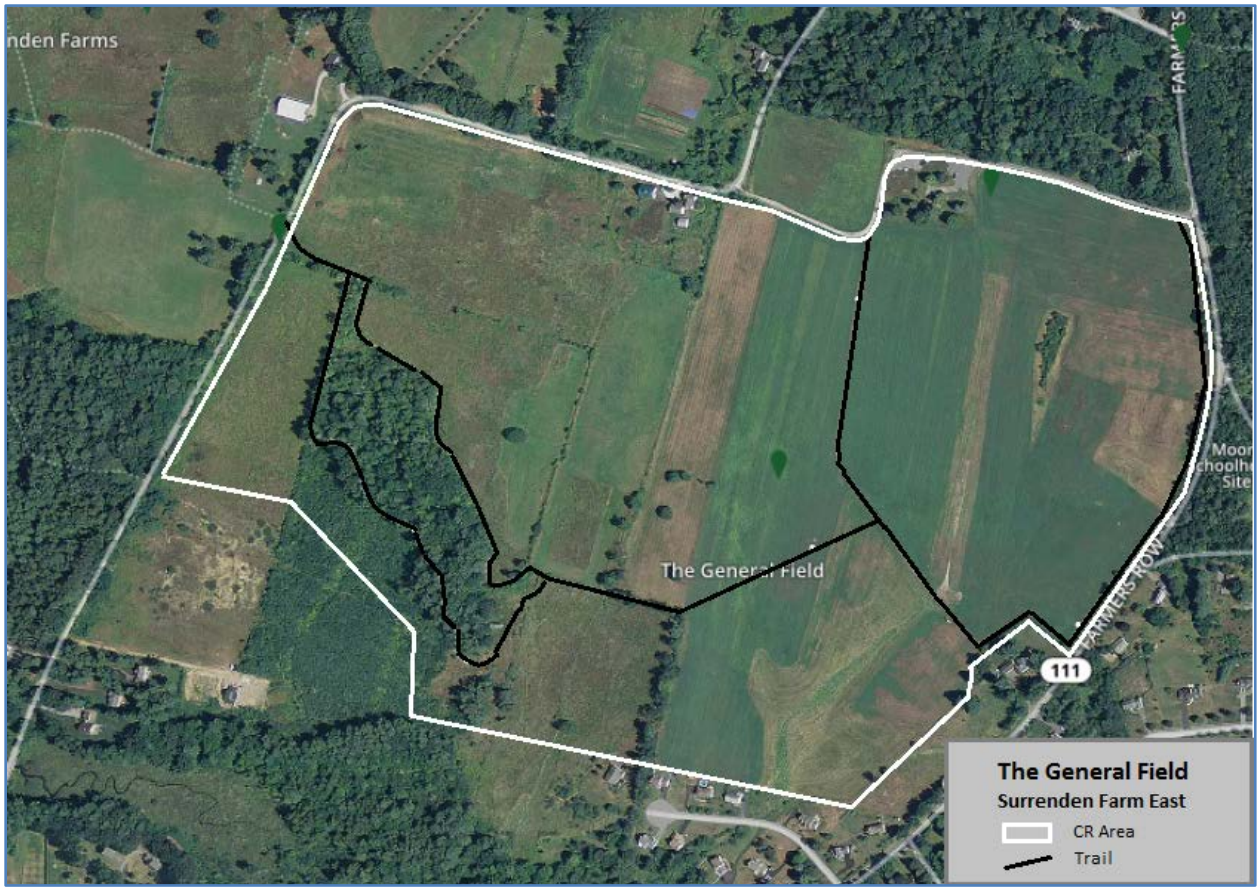
- Preserve and protect sensitive ecological areas such as vernal pools, oxbows, riverfront area, and bordering vegetated wetlands.
- Assure continued survival of state-listed, rare and common species of reptiles, amphibians, migratory birds, waterfowl, mammals, invertebrates, and plants.
- Improve access by providing adequate parking area, trail maps, and appropriate signage.
- Identify, preserve, and protect significant historic and archaeological sites, i.e., Native American sites, remnants of colonial settlement, and the Millerite community.
- Water Department access easement, future pump station oversight.
- Develop documentation leading to the nomination of Surrenden Farm to the National Register of Historic Places as a "Rural Historic Landscape".
- Develop standards and protocols for situations when conflict between natural and cultural resources arises.
- Conservation Commission to establish rules and regulations for use of Surrenden Farm.
- Consider signage to encourage positive behaviors (e.g., leave area as you found it; report any uses observed that are not permitted; fishing and hunting allowed according to state laws; bird and animal watching and photography allowed; nature study encouraged.)

History of Acquisition: Working with the Trust for Public Land (TPL), the Groton Conservation Trust, Groton School, and the Massachusetts Department of Fish and Game and the Division of Conservation Services, the Town of Groton realized the permanent preservation of 316 acres of Surrenden Farm on Farmers Row and Shirley Road in December 2006. These parcels contain an

abundance of natural resources, including extensive fields, woodlands, frontage on the Nashua River, and rare species habitat. The stone walls, hayfields, and proximity to James Brook and the Nashua River shoreline also speak to Groton's cultural heritage. This project was achieved through a town meeting vote allocating $5.6 million to be funded through the Community Preservation Act adopted by Groton in 2004, $5 million (with an additional $2 million added at closing) appropriated by Groton School, a $2 million grant from the Massachusetts Department of Fish and Game, $500,000 from the state Self-Help Program, as well as grants from private foundations and donations from generous citizens. It is rare to see this level of cooperation or this complex a project, but with TPL in the lead (committing funds, personnel, and resources) important partnerships were forged to bring the project to a successful conclusion. Efforts to fund a permanent stewardship endowment fund continue.

The east portion of Surrenden Farm, now known as The General Field, is owned by the Groton Conservation Trust, with a Conservation Restriction held by the Groton Conservation Commission. While much of this property continues to be hayed, there are trails that are open to the public. Please see the following map showing the extent of the Conservation Restriction and the trails on The General Field.

Surrenden Farm "East", a.k.a. The General Field



History of Property:

A. Pre-settlement – The following information is an excerpt from material prepared by Groton resident Georgess McHargue, a writer and historic researcher, for a commemorative volume published for the Town of Groton's 350th Anniversary in 2005:

Before the arrival of European settlers, the Native Americans of the Nashua Valley (and a territory including much of central Massachusetts and greater Worcester County) called themselves the Nipmuc. Their language was part of the Algonquian linguistic family, whose speakers inhabited a large territory from the Canadian Maritime Provinces to the Carolinas.

The first New Englanders were hardy, spear-carrying hunters and gatherers, clothed in animal skins and making their tools from chipped stone. Their only domestic animal was the dog. They did not, as was once thought, live principally by hunting large animals such as the mammoth and mastodon, but had a varied menu that included an assortment of plant and animal foods, from the occasional mammoth or (in those days) caribou to small birds, roots, and berries. Archaeologists call this first group of New Englanders the Paleoindians.

With the melting of mile-high glaciers, vegetation in southern New England gave way to mixed forests of pine, oak, and chestnut with undergrowth of shrubs and woodland plants. This landscape was not unlike that of today, except that the noble chestnuts have fallen victim to blight and there were no invasive jungles of multiflora rose, the swamp-engulfing loosestrife, or tenacious crabgrass, among other destructive plants introduced by European-Americans.

There were no permanent villages at this time. The Nipmuc and their neighbors found that a better survival strategy was to move as the seasons dictated. A simplified version of this seasonal wandering might look like this -- riverbanks in the spring for the annual run of shad, salmon, and alewife; the lakeshore for turtles and freshwater fishes such as bass in summer, with side trips to gather ripening berries; oak and chestnut forests in fall, both to harvest the fallen nuts and to prey on the deer and bears who were also attracted to them; and a good, south-facing hillside overlooking a wetland in winter so as to have access to the deer that fed on the tender bark of the willows.

The most significant development of this period, called the Woodland, was the practice of horticulture. The planting of corn, beans, and squash (all of which originated much further south), was supplemented with crops such as wild cucumber, sunflower, and goosefoot. Thus for the first time it became desirable to settle in semi-permanent villages during the growing season when plants needed tending. Houses, called wigwams, were built of branches bent and tied together, then covered with hides, woven mats, or slabs of bark to keep out the weather.

In addition to raising crops, the Nipmuc and most other local tribes practiced a form of forest management in which the low-growing shrubs and vines were periodically burned from the forest floor without damaging the mature trees. The Nipmuc knew that the fire would be followed by succulent young growth that would attract deer and moose. Thus the forest encountered by Groton's first European settlers was both much more mature than today's second- or third-growth tree crop and also easier to travel through.

The proximity of the confluence of James Brook (possibly named after a Native American named "James" during the Colonial period) and the Nashua River to Zone 1 increases the potential of Surrenden Farm to contain significant Native American sites from all periods of occupation.

B. Colonial – modern period. Historian Sanford Johnson, a Groton resident, prepared an extensive narrative for the Groton Historical Commission on the Surrenden Farm area in October 2007. It covers parcels both to the east and west of Shirley Road, as well as the four existing houses. The following is a condensed excerpt from Mr. Johnson's report with additional commentary from William Conley, former farm manager for Gibbet Hill Farm:

The Surrenden Farms area is characterized by its far-ranging westerly views toward Mt. Wachusett and other eminences of central Massachusetts and southern New Hampshire. Large open fields comprise most of the property and reach west to the Nashua River. Agricultural activity beginning in the colonial period has continued in the area and thus the appearance of farm fields and pastures remains predominant. The bank of the Nashua River at the southwestern edge of the property is the site of a horse cemetery consisting of granite stones placed on end in a row overlooking the river. No inscriptions are visible on the grave markers.

During the 1620-1675 timeframe, the majority of the town's European residents clustered around the intersection of modern day Main and Hollis Streets in Groton Center. Efforts to settle outlying parts of the town were hampered by unstable relations with warring Native Americans. Farmers Row was laid out around the same time as the Main Street-Boston Road corridor and was designated as a county road by 1673. In an attack by Native Americans on Groton farmers in 1704, John Davis of Shirley Road was killed while taking in laundry, indicating the settlement of the Surrenden Farm area by that time. The 1832 Butler map of Groton identifies seven houses, mostly farms, in the area. The population increased slightly during the later 19th century with the influx of a religious sect of Millerites but then reverted to a small agricultural enclave of around three farms that bordered on the campus of Groton School located just north of Surrenden Farm.

Farming, including cattle-raising, hay and crop-growing, and general husbandry, was done on a subsistence basis. Around 1790, this part of Groton became known for the culture of hops, a crop that remained profitable until the 1840s. Production increased throughout the Federal period until by the end Groton was a center of the trade for surrounding towns where it was also grown. Henry Woods and the Groton-based Massachusetts Hops Company were notable dealers in the crop until the trade moved west.

From 1830-1870, the Surrenden Farm area was populated by five households, most of whom continued to make their living from agricultural activities. Crops were mainly for subsistence although some were undoubtedly shipped to Lowell and other cities via the Fitchburg Railroad after 1848. Fruit would have been a particularly common cash crop. Butler noted in his 1847 history of the town that the predominant crops were corn, barley, oats, potatoes, and rye, but hay was the chief crop for market. Apples, peaches, cherries, plums, and pears were becoming profitable to sell in Lowell with the growth of that city from the 1820's.

An interesting segment of the local population, profiled by Edward A. Richardson in the 1911 publication, *The Community*, was the membership of the Millerite sect who occupied land on both sides of the northern boundary of the area. From 1846 -1856, adherents of the Adventist religious principles of William Miller numbered around 50,000 nationwide and believed in the second advent of Christ and the end of the world between the vernal equinoxes of 1843 and 1844. Disappointed in March of 1844, Mr. Miller revised his estimate for the timing of the world's end based on new mathematical formulae taken from numbers mentioned in the various books of the Bible to occur in October, 1844, when, to the chagrin of those who had neglected daily farm chores or actually given away their property, the status quo prevailed. The local leader of Millerites in Groton was Benjamin Hall, a native of Westford who moved to Groton around 1840 and bought a farm of 120 acres along Shirley Road where he established his "Community", the name that the location of the Millerites' neighborhood would retain for several decades after their demise. Through the sale of parts of his farm to fellow believers, ownership of the Community was dispersed and expanded to around 12 households. The 1856 Walling map of Middlesex County shows approximately a half dozen residences, a hoop shop and blacksmith shop within the area. The core of the settlement was located near the stables of the Gardner House on the Groton School campus but extended south into the Surrenden Farms Area. According to Mr. Richardson the Community was also identified as 'Nonicanicus Village'.

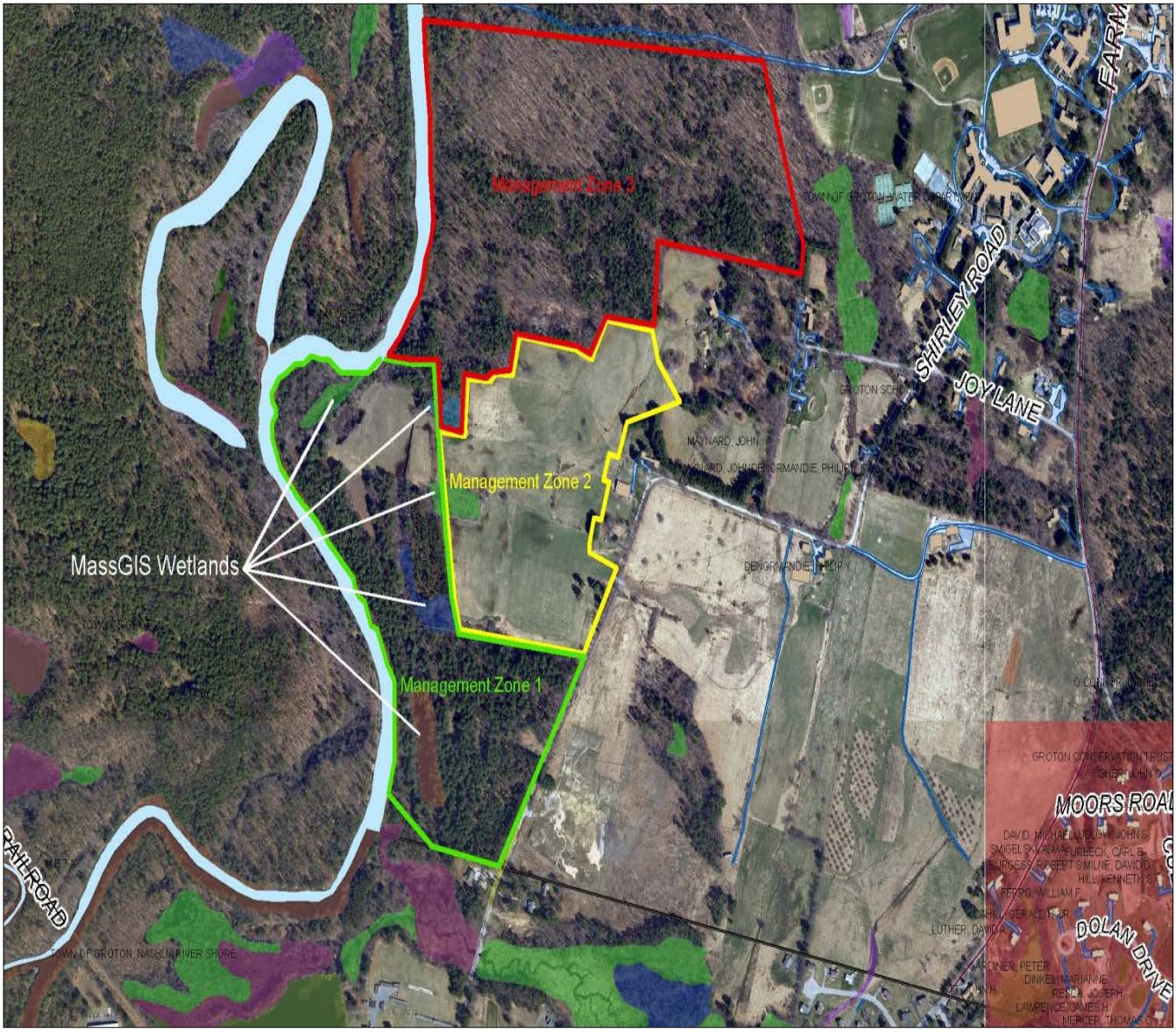
Modern construction is scarce in the area that continues to be dominated by large hayfields and forested land. Ownership by a single family (the Danielsons) through most of the 20th century and into the 21st has provided the parcels with a measure of protection from development. The Groton Hunt was established in 1922 by the Danielson family and sponsored fox hunts throughout the town and surrounding region. Richard E. Danielson, president of the *Atlantic Monthly* from 1940 until his death in 1957, was the Master of Foxhounds of the Groton Hunt Club from 1922-1936. The Groton Hunt Stable was located on the property, with the kennels for foxhounds operated on the east side of Shirley Rd. The Surrenden Farm area was heavily used for equine activities from 1936 through the early 1960's. A hunt course was set up within the property with a stand of red pine planted to provide shade for the ring. Barbara Danielson, wife of Richard Danielson, gave the name "Surrenden Farms" to the area. She was a direct descendent of the Dering family from Kent, England whose estate was named Surrenden Dering. Her family included the founder of the Deering (the additional "e" was added after the migration of family members to the colonies in the 1600's–1700's) Milliken textile mills in Maine and the International Harvester McCormick Deering Co. in Chicago.

Surrenden Farm had orchards, as well as a small number of crossbred Angus/Hereford cattle aka "Black Baldies", which provided meat for the family during World War II when family members were living in Washington, D.C. The Danielsons' daughter, Marion Strachan Campbell, worked to establish pre-eminent Angus cattle breeding stock and managed the land for hay and the expansion of her herd. Starting with 11 Aberdeen-Angus cattle, she expanded the herd to 120 by 1953. By 1964, the Danielson Estate occupied 400 acres in this southwest corner of Groton. A 10-acre parcel on the east bank of the Nashua River was deeded to the Groton Water Department in 1999 as part of the development of the former "poor farm" into the Ames Meadows subdivision. This is the site of twenty-two granite monuments which mark the burial place of family and Groton Hunt Club horses in a cemetery established by the Danielson family in the first half of the 20th century.

Management Zones within the Property

The property has been divided into three distinct areas or zones (see Map 2) with each zone characterized by unique qualities. Management Zone 1 (MZ 1) is primarily designated for wildlife and endangered species habitat protection. Management Zone 2 (MZ 2) is primarily designated for agricultural and recreational uses. Management Zone 3 (MZ 3) is primarily designated for forestry management and recreational uses. Expanded definitions of the uses and purposes which each zone may support are provided in the following pages.

Map 2 – Management Zones



MANAGEMENT ZONE 1

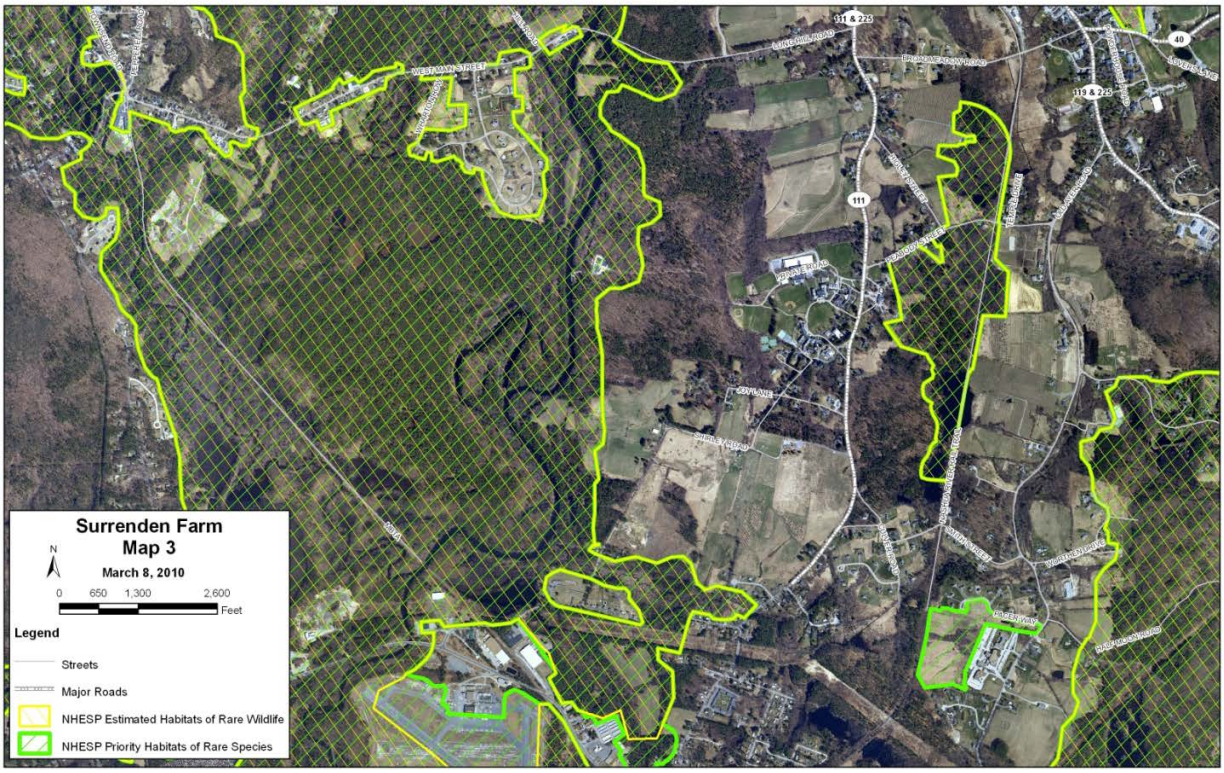
Natural Resources:

This area is characterized by upland red pine forest, low-lying woodlands, and significant riverfront area along the Nashua River. The riverfront contains several oxbows, old river meanders, and extensive floodplain. Management Zone 1 (MZ 1) includes approximately three-quarters of a mile of Nashua River shoreline. The southern-most boundary with the Town of Ayer adjoins the former Ayer State Game Area owned by the MA Division of Fisheries & Wildlife most of which is in the Town of Ayer. After flowing through the center of Groton and picturesque farm land along Old Ayer Road, James Brook empties into the Nashua River at this juncture. Further north in Zone 1, the Nashua River makes a graceful western curve around the 10-acre Groton Water Department parcel, across from the Dead River (in the Groton Memorial Town Forest), an oxbow of the Nashua River that only flows when storms substantially raise the River's water level. The riverfront area provides intimate and exceptional views of the Nashua River and the abundant wildlife that flies, swims, and walks along the River.

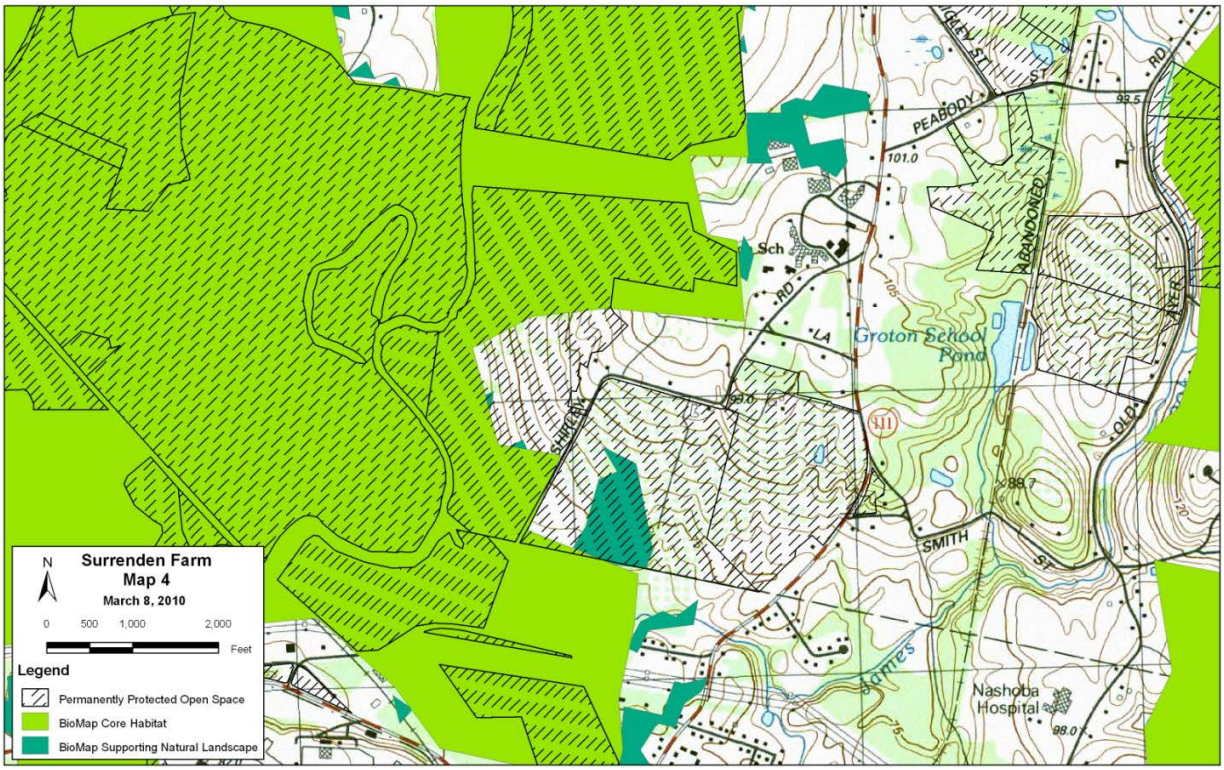
More than half of MZ 1 is distinguished by significant wetland resource areas regulated under the state Wetlands Protection Act and the Groton Wetlands Protection Bylaw. This jurisdiction extends to specific resource areas identified in the Act: the 200-ft. Riverfront Area adjacent to the Nashua River (includes the 100 ft. inner riparian zone), the somewhat steep Banks of the River itself, Bordering Vegetated Wetlands (BVW), the 100-ft. buffer to Bordering Vegetated Wetlands, and Bordering Land Subject to Flooding.

Species richness is expected to be highest in MZ 1 due in part to the diversity of landscapes. MZ 1 is within Priority Habitat for Rare Species (pursuant to the Massachusetts Endangered Species Act or MESA), Estimated Habitat for Rare Species (pursuant to Massachusetts Wetlands Protection Act), and BioMap Core Habitat. (See Maps 3 and 4) According to the Natural Heritage & Endangered Species Program (NH&ESP), the BioMap identifies those "areas most in need of protection in order to protect the native biodiversity of the Commonwealth. BioMap focuses primarily on state-listed rare species and exemplary natural communities but also includes the full breadth of the State's biological diversity. The goal of the BioMap is to promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts' terrestrial and wetland plant and animal species and natural communities."

Map 3 – Rare Species Habitat



Map 4 – BioMap Core Habitat



The state-listed species for which these maps are drawn include: Blanding's turtle (*Emydoidea blandingii*), wood turtle (*Glyptemys insculpta*), Eastern box turtle (*Terrepene carolina*), blue-spotted salamander (*Ambystoma laterale*), four-toed salamander (*Hemidactylium scutatum*), triangle floater mussel (*Alasmidonta undulata*), 2 state-listed dragonflies, plants, etc. Blanding's turtles are state-listed as "Threatened" and are reptiles of regional significance. These turtles move great distances over a wide-variety of wetland and upland habitat types to satisfy life requirements. Habitats include those found at Surrenden Farm: river, streams, oxbow ponds, vernal pools, shrub wetlands, fields, forests, abandoned gravel or borrow pits. The juxtaposition of wetland-upland habitats in this zone attracts a diversity of fauna including amphibians, reptiles, large and small mammals, waterfowl, song birds, wading birds, insects, and other macroinvertebrates. Based on limited field observations (animal trails, scat, and other sign), common wildlife species are active within MZ 1, especially along the top of the Nashua River bank, where an active wildlife trail is visible.

Flooding is a significant feature of much of Zone 1. The 100-year floodplain is defined by an elevation of 213.4 ft. Within the floodplain are pockets of wetlands nourished by groundwater and rainfall as well as nutrients from the Nashua River when it periodically overflows its banks. The soils in this area, including the Water Department parcel, are chiefly in the Winooski series and are moderately well drained and composed of recently deposited alluvial sands and silts. Terraces, due in part to erosion, and delta-outwash plain deposits characterize the southern-most portion of the parcel at the Ayer Town boundary and were formed during the Wisconsin age of the Pleistocene era.

As mile high glaciers melted and retreated 12,000 to 14,000 years ago and glacial Lake Nashua drained through successively more northerly outlets, this area of Groton (along with the rest of New England) was left scraped and bare. The drying sand from the former lake bottom was swept into dunes in the central portion of MZ 1, and these dunes were discovered to be a ready source of sand and mined in more modern times. Forester Gary Gouldrup identifies this site with a longitude of 42˚35.072'N and latitude of 71˚35.927'W in his *Surrenden Farm Baseline Documentation Report* where a photograph reveals a forest of young white pine saplings becoming established in the former gravel pit.

The upland areas within MZ 1 are dominated by Windsor (loamy sand with major limitations related to droughtiness and slope) and Deerfield (somewhat limited by a seasonal high water table) soils. A small section of the northeast part of MZ 1 has Birchwood soils which are characterized by a perched seasonally high water table. This is the highest elevation of MZ 1 at 252 ft.

Management Zone 1 Goals:

I. *Conservation and management of wildlife, plants, and natural communities*
   A. Prepare a Rare Species Management Plan according to the Conservation Restriction.
   B. Identify and map wildlife and plant species and habitats.

1. Conduct long-term, seasonal species surveys to identify wildlife activity areas, corridors, species presence, rare and uncommon plants, and natural community types.
2. Use best available field techniques to determine habitat use including direct observations, sign, photography, dip-netting, pit-fall traps, baited traps, radio-telemetry, visual and aural recording, wildlife cameras, black-lighting, as time permits and resources allow.
3. Enlist staff from MA Division of Fisheries & Wildlife, NH&ESP, and local experts, as well as local nature enthusiasts and students from Groton School.
4. Maintain maps of species accounts; submit Rare Animal Observation forms to NH&ESP. Rare species locations should not be public documents.

C. Create, restore, and expand turtle nesting opportunities. The availability of nesting habitat near feeding and breeding habitats is a limiting factor for turtles. Adult female turtles must often move great distances to find suitable nesting habitat, putting them at greater risk of road mortality or injury, and encountering other obstacles.
   1. Remove red pine plantation and develop as turtle nesting site.
   2. Develop and implement turtle nesting habitat program.

D. Minimize wildlife disturbance.
   1. Avoid designated and maintained trails in MZ 1.
   2. Utilize an interpretive kiosk planned near the parking area at MZ 2 to inform people of ecological sensitivity of MZ 1, and update on current research, findings, and sightings. Signage or a kiosk in a central location in Surrenden Farm will direct trail users to MZ 2 and MZ 3 where recreational trail use should not impact wildlife habitat or wetland resource areas.
   3. Monitor impact of trail users and address negative impacts quickly and effectively.
   4. Regular monitoring inspections will be conducted by the Groton Trails Committee, Groton Conservation Commission, and MA Division of Fisheries & Wildlife.
   5. Dumping area at old forestry landing should be closed off at the street.
   6. Improve wildlife habitat.
      a. Create brush piles.
      b. Work with farmer to have lower fields mowed annually after September 1 for benefit of birds and insects. (See Map 7 under MZ 2)
      c. Fencing is a constraint to wildlife movement between the River and other wetland resource areas. It also serves as a barrier to the free movement of floodwaters across the area. Removal of the fence or creating breaks in the fencing would improve the habitat value, including the fencing that runs perpendicular to the River.
      d. MZ 1 is the site of a localized dump where abandoned motor vehicles and other farm equipment are visible. Consideration will be given to removing this debris, perhaps in combination with improvements or in conjunction with forestry activities.
      e. The evaluation of the status of exotic, invasive plant species is necessary on all parts of Surrenden Farm to assure continued species diversity. A

plan will be developed to identify, control, and monitor areas of infestation.

7. Post south boundary to avoid encroachment problems.
    a. MA Division of Fisheries & Wildlife post Conservation Restriction signs and no motorized vehicle signs, every 75-100 feet.

II. *Agriculture* – At this time, no agricultural activities are proposed within MZ 1. However, annual brush mowing will occur in the fall within the floodplain field and the area next to the red pine stand to maintain grassland habitat for wildlife.

III. *Cultural Resources*

Known cultural resources within MZ 1 currently consist of historic period features including standing structures, Shirley Road, cellar holes, stone walls, field drainage systems and other remains of the past not yet located and analyzed. These include zones of moderate to high archeological potential which may contain remains of currently unknown historic period and prehistoric period archeological sites. A program of resource discovery, protection, and interpretation will allow for the proper stewardship of the cultural resources of MZ 1.

A. Locate and manage prehistoric and historic period archeological resources.
    1. Prepare grant application for Community Preservation funding to plan and implement an Intensive Archeological Survey IAW 950 CMR 70 in MZ 1, 2, and 3.
        a. Obtain an archeological consultant meeting the qualification standards of 950 CMR 70
        b. Conduct both the Reconnaissance level and Intensive Survey level studies of MZ 1, 2, and 3.
        c. Map all discovered archeological sites
B. Prepare protection and management protocols for all discovered sites.
C. Prepare an Unexpected Discoveries protocol for MZ 1, 2, and 3.
D. Plan and implement an Interpretive Plan for the history and archeology of MZ 1, 2, and 3.

IV. *Forestry*

Any forestry activities proposed in MZ1 will be conducted in a manner beneficial to wildlife and plants. Based on the *Baseline Documentation Report*, it is estimated that forestry activities were conducted approximately 25 years ago in MZ 1. Former manager of the farm, Bill Conley, confirms that forestry plans were prepared for the wooded portions of the farm, and at least two cuttings of pine and an on-going cordwood program were conducted in the 1970's and 1980's for timber stand improvement. The remnants of the log landing are still in evidence in a cleared area off Shirley Road just before the Ayer boundary. This area has also been used as a site to dump landscape debris. Any proposed active forestry will require the preparation of a Forestry Management Plan approved by the State Forester in accordance with the Conservation Restriction. Logging is an acceptable practice within Management Zone 1, but is likely to have constraints regarding the time of year, the proximity to wetland resource areas, and the amount of tree canopy removed due to the presence of rare species habitat.

A. Prepare a Forestry Management Plan approved by the State Forester in accordance with the Conservation Restriction.

1. The Forestry Management Plan shall be reviewed by the Natural Heritage & Endangered Species Program at the MA Division of Fisheries & Wildlife and the Northeast District Manager at MA Division of Fisheries & Wildlife. Conduct a sustainable harvest that promotes and improves wildlife habitat; improve the vigor and age/species diversity of the forest while also preserving large trees for denning and nesting sites, create brush piles for snakes and mammals, as well as snags for wildlife use.
2. Replace red pine plantation with turtle nesting area.

V. *Public Access & Recreation*

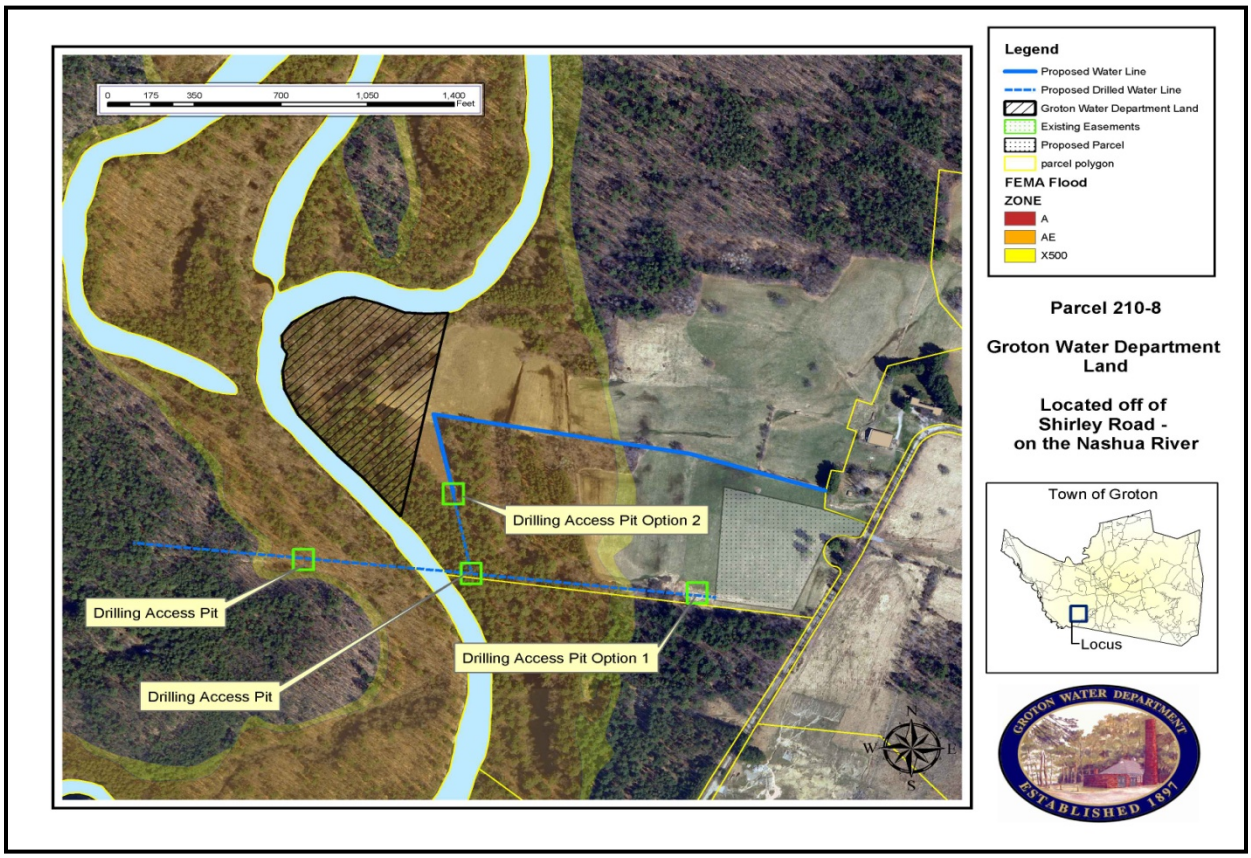
MZ 1 is in an out-of-the-way location for many Groton citizens, but is in close proximity to a low-density suburban residential section of the Town of Ayer. Due to the ecological sensitivity and known presence of rare wildlife species in MZ 1, no marked or maintained trails are planned in this area. Pathways within MZ 1 will be open for public access and are likely to see use by hunters, fishermen, wildlife biologists, and educators. The public will not be directed to these trails, and the area will be strictly monitored for abuse or over-use. As with the remainder of Surrenden Farm, illegal use by motorized vehicles (including motorcycles, all-terrain vehicles, and snowmobiles) is prohibited. Enforcement of this prohibition will be through educational signage, publications in the local newspaper, and assistance from the state Environmental Police and local Groton Police if necessary. The Groton Conservation Commission, through its 'Regulations for the Use of Conservation Land', can issue fines for unauthorized use of motorized vehicles in MZ 1.

VI. *Public Water Supply*

A. Work with Groton Water Department to relocate the utility easement and pump house location into MZ 2. Moving the easement into the field road would involve fewer disturbances to MZ 1, almost no tree removal within MZ 2, little to no vegetation maintenance since the farmer maintains the hay fields, and ease of siting and access to pump house. Siting the pump house near Shirley Road can avoid regulatory review of the project under the MA Wetlands Protection Act and the MA Endangered Species Act. (See Map 5)
   1. Work with Groton Water Superintendent to finalize easement and pump house locations.
   2. Obtain copy of easement language and plan and review with legal counsel.

B. Ensure that activities within the easement receive required regulatory permits.
   1. MZ 1 includes both the AT&T easement and the Groton Water Department access easement. Any activity to utilize these easements requires a filing with the Conservation Commission if it falls within jurisdictional wetland resource areas or their buffers. The area is currently forested.
   2. Compliance with the MA Endangered Species Act (MGL Ch. 131A) through review by the Natural Heritage & Endangered Species Program.
   3. DEP approvals.
   4. Develop Water Supply Management Plan per the Conservation Restriction.

Map 5 – Proposed Water Line Routing



MANAGEMENT ZONE 2

Natural Resources:

This area has a long tradition of farming, primarily as a hayfield and for livestock grazing. Fencing, accompanied by a hedgerow of invasive plant species and several shade trees, currently bisects the fields. A major farm road runs from Shirley Road almost to the Nashua River. The upland soils within this Zone were derived from the till of ground moraines left during the glacial period. The gently rolling hill that characterizes much of Zone 2 is the most common New England glacial deposit and often contains angular rock fragments and minor sand and gravel. The soils closest to the Nashua River are Winooski floodplain soils as described in MZ 1. Further up on the topography is a band of Windsor and then Deerfield, both loamy sandy soils, but of state-wide importance as agricultural soils. Prime agricultural Scituate soils are situated still higher on the landscape although these soils can have limitations due to the restrictive layer about 2 feet down that perches water. Aerial photographs reveal a number of drainage swales throughout MZ 2 which likely reflects a failed underground tile drainage system.

The vista from the top of the field of MZ 2 toward the western hills provides exceptionally expansive views of the southwestern and western mountains, including Mt. Wachusett in Princeton, MA and Mt. Watatic in Ashburnham, MA. Currently, the mosaic of field and forest landscapes on Management Zone 2 provides users with a wide range of experiences and views. The contrasting ecosystems provide a lot of edge habitat which is likely to be utilized by a wide range of wildlife that tend to be 'generalists' without specific habitat or food requirements. Such forest-field interfaces provide habitat for many species of birds and other animals that do not live exclusively in one or the other environment. The fields provide habitat for grassland birds, raptors, mammals, turtles, and invertebrates.

Agriculture:

In voting to fund the permanent protection of Surrenden Farm, Groton residents also recognized the value of maintaining the fields in agricultural use. Farming comes in many different forms and may mean the production of hay for horses and cattle. Haying preserves wildlife habitat and recreational uses to a greater degree than other agricultural uses. Use of the land for pasturing animals is another possibility. Moderate to large scale activities such as Civil War reenactments are excluded from Surrenden Farm due to potential significant adverse impacts to wildlife, wildlife habitat, hunting, hayfields, and other recreational uses. Activities will be considered on a case-by-case basis.

MZ 2 has historically been used for agriculture, with these activities beginning during the 18th century and continuing throughout the 19th and 20th centuries. It is therefore reasonable that MZ 2 be kept in active agriculture. Because of the size of these fields (approximately 30 acres) and the presence of known rare wildlife, it was agreed that working with one individual on a long-term basis to keep these fields in an open state was the preferable management strategy at this time. Since some of these soils are highly erodible, having the soils in permanent hay production will also protect against erosion. In addition, both due to wetness and the mix of wildflowers and grasses in the west and southwest edges of the field in MZ 1, delayed mowing (after fall bird migrations) would allow this early successional grassland to flourish. This requires a farmer with large scale equipment and the ability to delay mowing until any ponded areas have dried out.

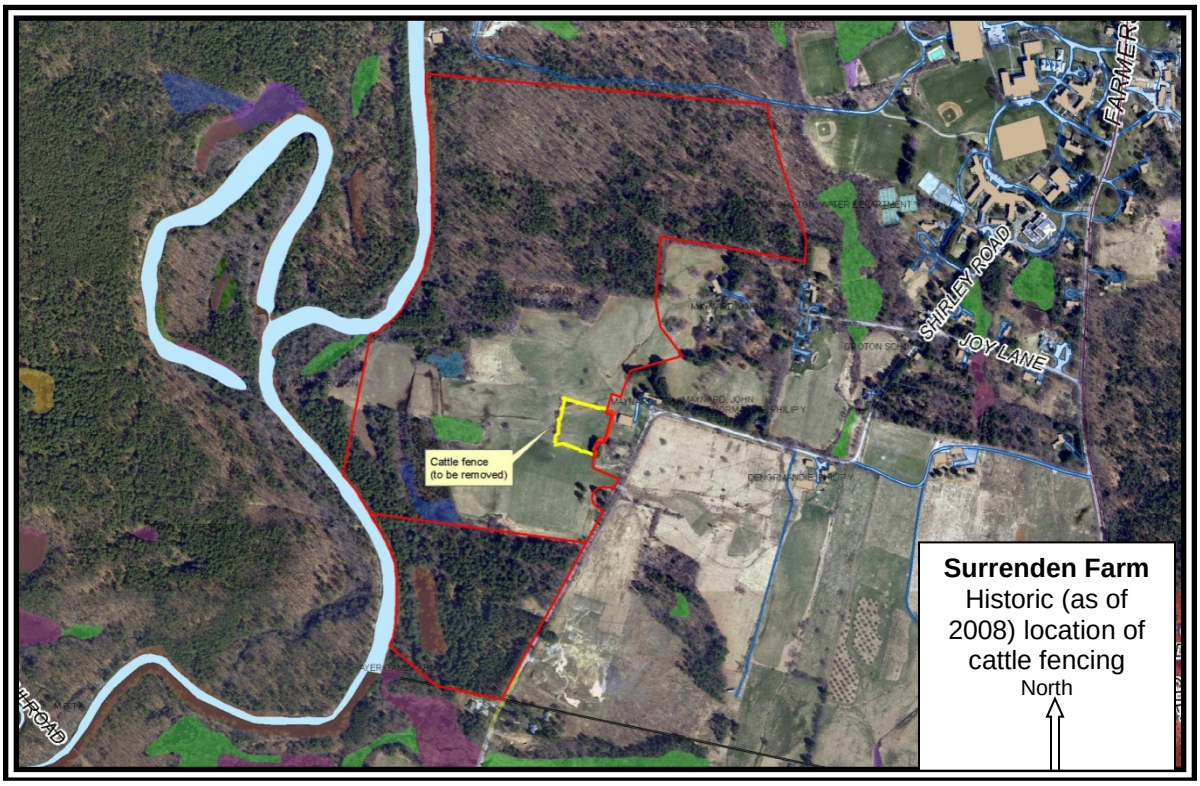
Keeping these fields as a mosaic of grassland at varying stages preserves additional wildlife habitat.

The removal of fencing that currently bisects the field, as well as the fence that parallels Shirley Road, would allow for the creation of an accessible, single contiguous field to allow for more efficient haying. Establishing a long term license with a farmer provides an opportunity to best manage the hay fields for nutrients (fertilizing and liming), keeping brush cleared from fence lines and under trees to allow haying equipment access, and maintaining or repairing the drainage ways and tile drains. This also allows the farmer an opportunity to incorporate his/her business planning into the farming operations necessary to keep the land well maintained and productive.

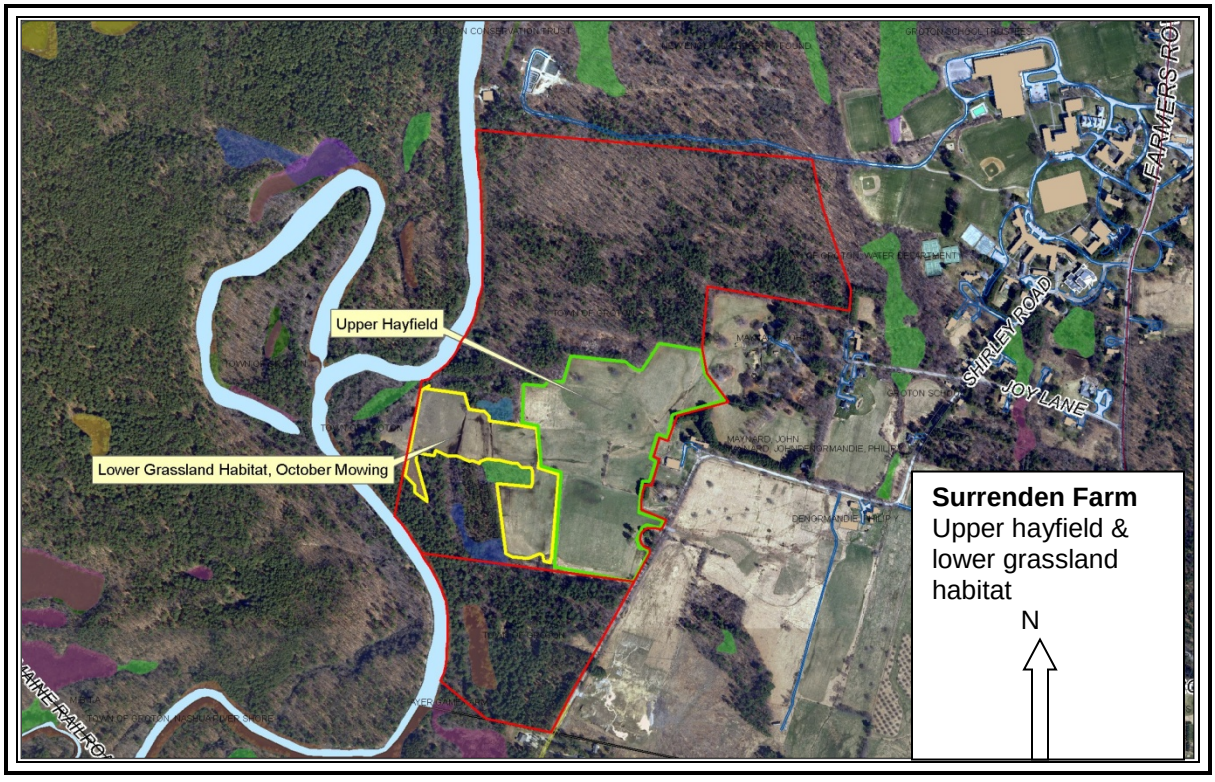
Management Zone 2 Goals:

I. *Develop optimal agricultural arrangement to balance farming, recreational, water supply, and wildlife uses of MZ 2.*
   A. Agricultural management bid and license specifications shall address the duration of the agricultural license arrangement with a preference for a 10 year period, identify crops to be grown, soil testing to define liming and fertilizer needs, cover cropping, and the use of herbicides. Reclamation of the agricultural fields will be phased and may include the use of herbicides to kill weeds, the planting of an interim cover crop of winter rye to yield straw the following June, followed by plowing.
      1. Public recreational uses by groups, i.e., dog trials, dog training, mock fox hunts, etc. will be limited to the period between October 1st until the beginning of mud season by written permit of the Conservation Commission and MA Division of Fisheries & Wildlife approval.
      2. Follow Massachusetts and Federal guidelines for the use of pesticides and herbicides.
      3. Mow field perimeter trails to steer recreational users away from actively farmed fields during the summer months.
      4. Fields may be mowed per the plan shown on the MZ 2 Mowing Zones and Schedule map below. (See Map 9)
      5. Central interior fencing and that paralleling Shirley Road, gates, and old farm buildings shall be removed. (See Map 6)
      6. Late mowing (~September 1) of lower floodplain grassland habitat fields (7 acres) and southwest lower grassland field (4 acres) as part of management strategy for MZ 1. (See Map 7)
      7. Maintenance, upgrading or removal of drainage structures should be considered as part of ongoing agricultural management. (See “Mapped Drainage Structures MZ 2” – Appendix D).

Map 6 – Cattle Fencing



Map 7 – **Upper & Lower Fields / Grassland Habitats**



II. *Wildlife & Habitat Management*

A. Conduct long-term, seasonal species surveys to identify wildlife activity areas, corridors, species presence, rare and uncommon plants, and natural community types.

B. Monitor use of fields by birds and turtles in response to mowing, as time permits.

C. The farmer who contracts to maintain the agricultural fields shall adhere to the *Mowing Advisory Guidelines in Turtle Habitat* (Appendix B) as far as practicable. The mowing regime will follow that outlined under MZ 1 and shown in Map 9.

D. Monitor impact of trail users and address negative impacts quickly and effectively.
   1. Regular monitoring inspections will be conducted by the Groton Trails Committee, Groton Conservation Commission, and MA Division of Fisheries & Wildlife.

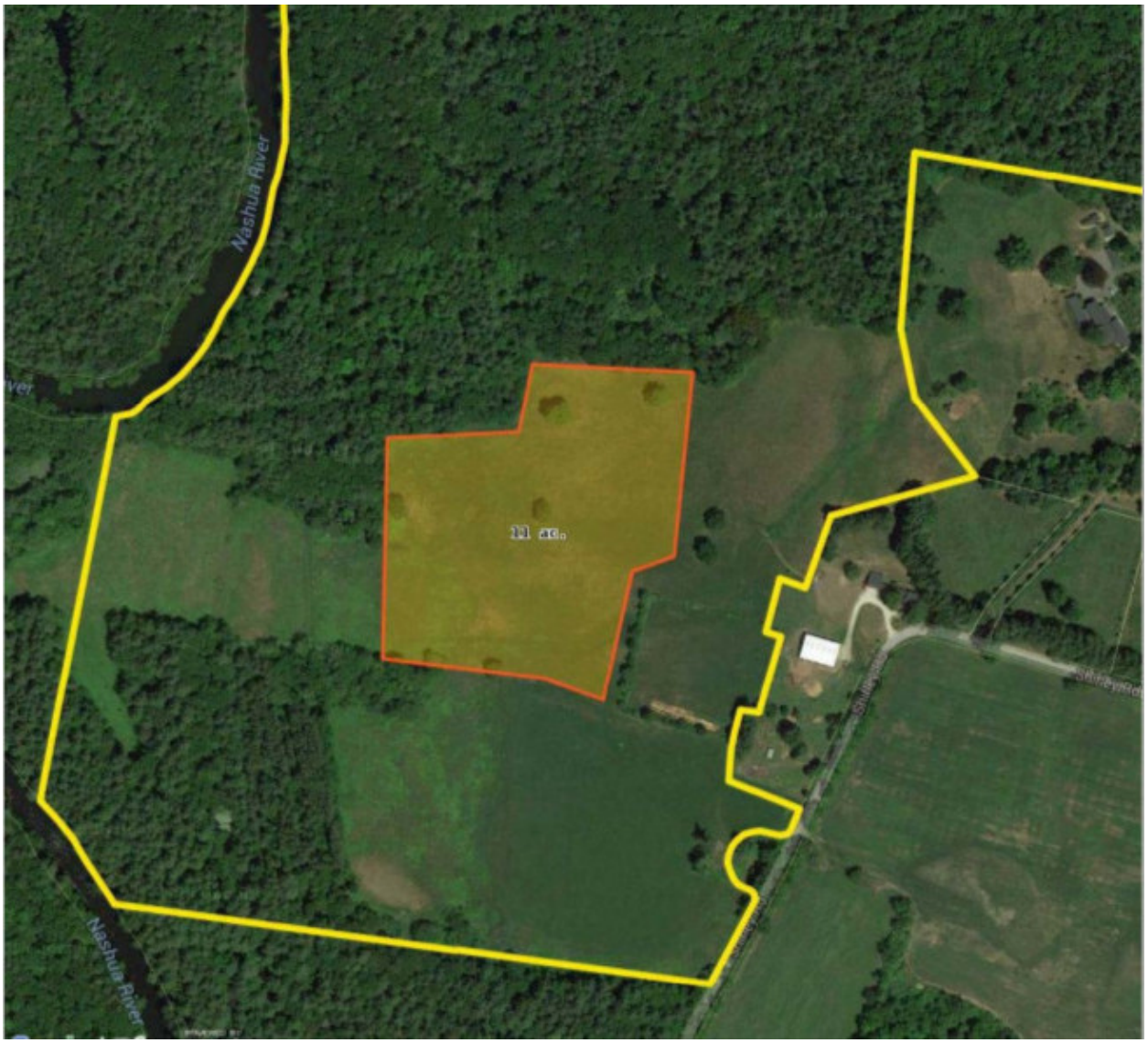
E. Inventory fields for use by birds, reptiles, invertebrates, and small mammals which are likely to attract larger predators.
   1. Early season mowing shall follow the timing and exclusions laid out in the MZ 2 Mowing Zones and Schedule (Map 9). Creation of a Bobolink exclusion zone (Map 8). There shall be no mowing or access permitted within the exclusion zone from May 1st through August 1st.
   2. Installation of nesting boxes for bluebirds and kestrels may be conducted at the discretion of the Conservation Commission.

F. Consider applying for funding through The Bobolink Project (Mass Audubon) or other available programs to pay the farmer to not hay certain fields or to mow them when the grasses are past their prime.

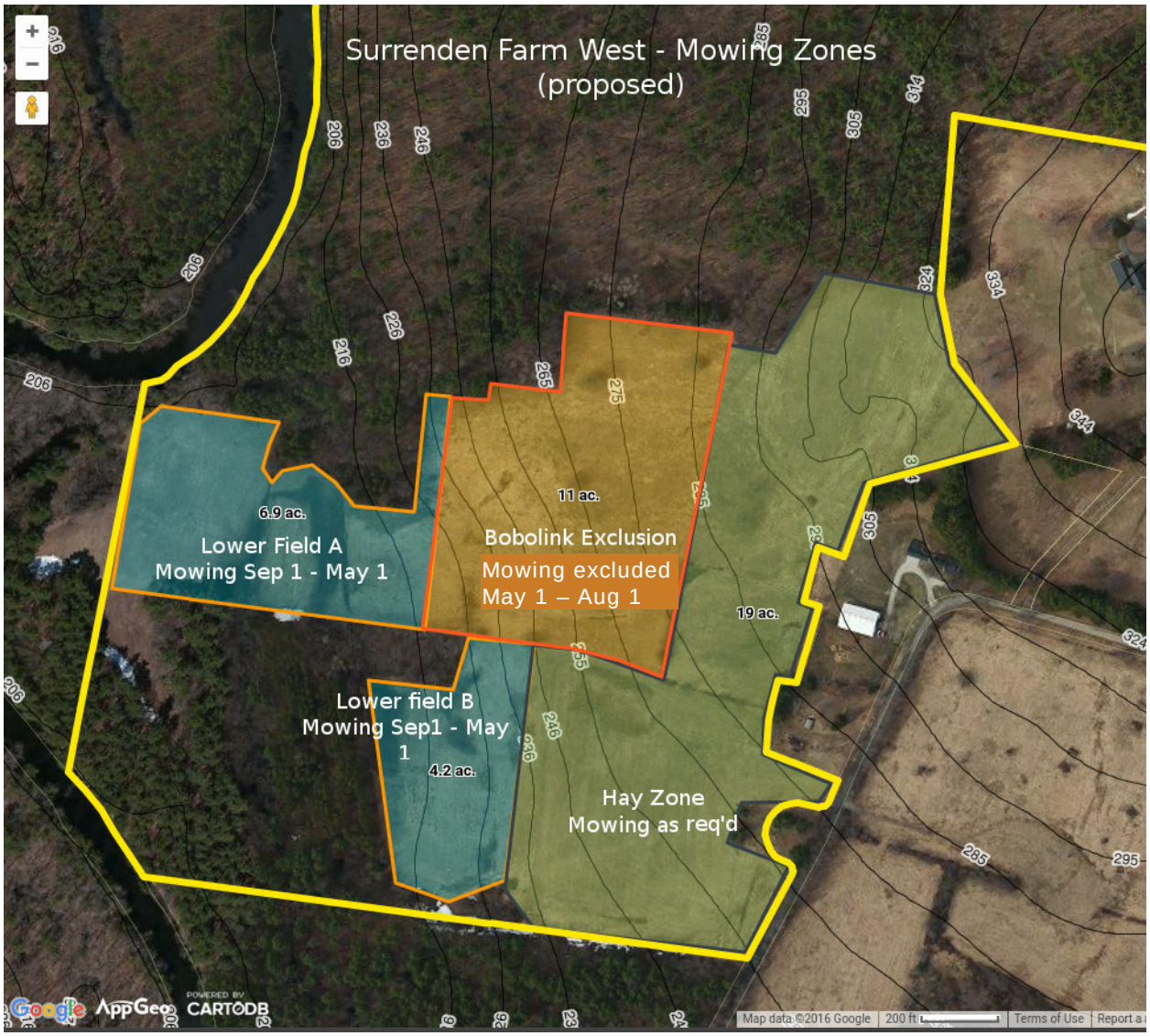
G. Identify and preserve areas with rare plants.

H. Monitor and manage for invasive plant species.
   1. Develop protocol for control of invasives as necessary.

Map 8 – Bobolink Exclusion Zone Map



Map 9 – MZ 2 Mowing Zones and Schedule



III. Cultural Resources

Known cultural resources within MZ 2 currently consist of historic period features including standing structures, Shirley Road, cellar holes, stone walls, field drainage systems and other remains of the past not yet located and analyzed. These include zones of moderate archeological potential which may contain remains of currently unknown historic period and prehistoric period archeological sites. A program of resource discovery, protection, and interpretation will allow for the proper stewardship of the cultural resources of MZ 2.

A. Locate and manage prehistoric and historic period archaeological resources.
   1. Prepare grant application for Community Preservation funding to plan and implement an Intensive Archaeological Survey IAW 950 CMR 70 in MZ 1, 2, and 3.

a. Obtain an archeological consultant meeting the qualification standards of 950 CMR 70
b. Conduct both the Reconnaissance level and Intensive Survey level studies of MZ 1, 2, and 3.
c. Map all discovered archeological sites

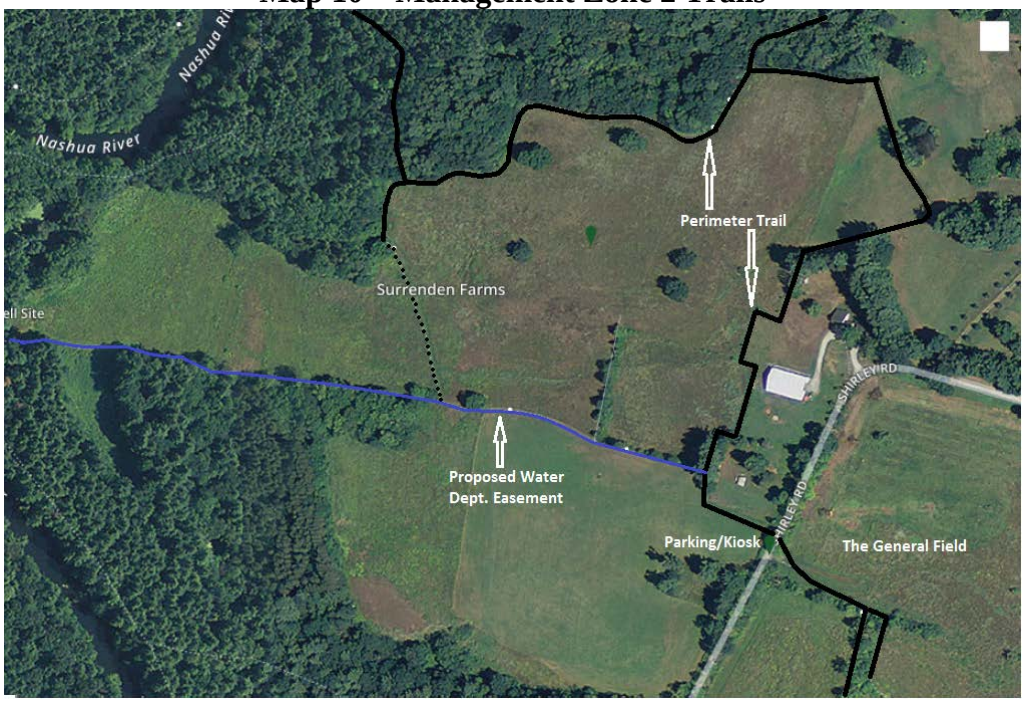
B. Prepare protection and management protocols for all discovered sites.
C. Prepare an Unexpected Discoveries protocol for MZ 1, 2, and 3.
D. Plan and implement an Interpretive Plan for the history and archeology of MZ 1, 2, and 3.

IV. *Forestry: No active forestry practices are anticipated within MZ 2 as it is mostly open meadow and fields.*

V. *Public Access & Recreation*

Public access and recreational activities will need to be conducted in a manner that does not interfere with agricultural use of the Zone. It is expected that most users of MZ 2 will seek the mountain vistas in the northeastern corner of the Zone. Bird watchers and other animal observers will also likely visit MZ 2 because of its open field and long sight lines. The upper hay field and lower grasslands provide opportunities for hunting upland game birds, turkey, coyote, and deer. In the winter, the slope of the land from Shirley Rd. down to the Nashua River may provide recreational opportunities for cross-country skiing, snowshoeing, and perhaps some tobogganing or tubing. The most frequent users of MZ 2 are likely to be equestrians due to the openness of the terrain and the connection through the fields to trails that continue far to the north. The fields of MZ 2 also provide an important link from MZ 3 trails to The General Field/Groton Conservation Trust trails on the east side of Shirley Rd.

Map 10 – Management Zone 2 Trails



Map 11 - The General Field Trails

MZ 2 is the most centrally located area with frontage on a public way from which parking will be provided for recreational users to access Surrenden Farm. Due to the narrowness and poor condition of Shirley Road, however, it is anticipated approximately 5 parking spaces could be provided off street within the east boundary of the property. (See Map 10 – MZ 2 Trails) Given the constraints of the current road conditions and budget, it is proposed that any large user groups requiring a van, school bus, or horse trailers will park on the paved surface at the parking area on The General Field.

A. Assure adequate opportunities for access.
B. Create parking area for recreational users.
    1. Provide low impact off-road parking parallel to Shirley Road for a distance of 200 feet.
    2. Review parking location within context of cultural resources.
C. Construct kiosk with trail map and rules for use.
    1. Include a map of the entire Surrenden Farm parcel that indicates the locations of all designated public trails. The trails themselves should be identified with the circular Groton Trail Network trail markers that the Groton Trails Committee uses to indicate trails throughout Groton. The Groton Trails Committee uses three different colors of trail markers to indicate different types of trails (main or "through" trails, secondary trails, and others), and the use of the different colors would be determined based on expected patterns of use of the trails in Zones 2 and 3.
    2. Post hunting seasons prominently and encourage users to wear some item of hunter's orange clothing. Annually post hunting season table for MA Division of Fisheries & Wildlife Hunting and Fishing Abstract.

3. Incorporate interpretive cultural history of the site.

D. Design trail layout and connections. Note: Trail development and maintenance is subject to MA Division of Fisheries & Wildlife approval. Trails may be closed, moved, or altered as needed to protect wildlife, habitat, and other natural resources per the Groton Conservation Commission and MA Division of Fisheries & Wildlife.
   1. Avoid or minimize crossing wetland areas that could require bridging or seasonal limitations.
   2. Avoid trail layouts that would interfere with farming activities.
   3. From the parking area, trail users can opt to head west or north to follow one of two loop trails. The trail layout will include the farm road that bisects MZ 2, as well as a small loop perimeter trail around the field, connecting with two other trails that traverse MZ 3 in a larger loop.

E. Marking and maintenance of trails.
   1. Access to some trails may be seasonally restricted during mud season.
      a. Access to the trail bisecting the "Upper Hayfield" from the "Lower Grassland Habitat" (MAP 7) shall be closed during the early grassland breeding season May 1st though July 15th (See "Trail Plan" Map 9).
   2. Use arrow markers posted on existing trees to mark field perimeter trail.
   3. Identify trails with the circular Groton Trail Network trail markers that the Groton Trails Committee uses to indicate trails throughout Groton.
      a. Control of invasive and nuisance vegetation (i.e., poison ivy) is likely to require the use of herbicides approved in advance of application by the Conservation Commission.
      b. Consider community work days for removal of invasives.
   4. Quarterly monitoring by members of the Groton Trails Committee, and other members of the public who will be encouraged to report their findings to the Trails Committee, will be conducted to ensure that the perimeter trail of MZ 2 is being appropriately used. Trail locations will be reviewed from time to time to address erosion issues or downed trees that require re-routing.

VI. *Public Water Supply*

Due to the presence of floodplain in the lower portion of MZ 2, it is anticipated the planned Water Department pump house/treatment facility will be located on a more upland site within Surrenden Farm. (This is the same as for MZ 1.)

A. Work with Groton Water Department to relocate the utility easement and the well site/treatment/pump house facility into MZ 2. Moving the easement into the field road would involve fewer disturbances to MZ 1, almost no tree removal within MZ 2, little to no vegetation maintenance since the farmer maintains the hay fields, and ease of siting and access to pump house. Siting the pump house near Shirley Road can avoid regulatory review of the project under the MA Wetlands Protection Act and the MA Endangered Species Act.
   1. Work with Water Department Superintendent on possible easement and pump locations.
   2. Obtain copy of easement language and plan and review with legal counsel.

MANAGEMENT ZONE 3

Natural Resources:
This area is predominately upland characterized by mixed hardwood forest. A significant feature of this Zone is the approximately 1,900 linear feet of frontage on the Nashua River. This area is entirely forested, and there are many impressive, large white pines among extensive stands of red oak. The soils are generally poor for agriculture as both the Montauks and the Scituates are extremely stony. This area is characterized by 3% to 8% slopes grading to the Nashua River. Geologically, this hillside consists of till plastered in a relatively thin layer by the melting glaciers. Several drainage swales carry water down slope to the Riverfront Area. This is the largest of the three Management Zones.

Management Zone 3 Goals:

I. *Evaluate MZ 3 for safety and encroachment issues.*

A. Mark eastern boundaries of MZ 3 to assure no intrusion into private property and vice versa.

B. Assess status of two structures in poor condition, one located on the field end of the connecting trail between MZ 2 and MZ 3 in the northeastern corner of MZ 2 and the other near the corner of the eastern and northern segments of the loop trail. These structures presently present a safety hazard and should either be demolished or partially restored if they have archeological significance or historical interest, in accordance with IV below.

II. *Wildlife & Habitat Management*

Large mammals with correspondingly large home territories are likely to make use of all the Zones within Surrenden Farm. It is anticipated that interior forest birds will find the contiguous woodlands of the Farm to be suitable nesting habitat.

A. Conduct long-term, seasonal species surveys to identify wildlife activity areas, corridors, species presence, rare and uncommon plants, and natural community types.

B. Inventory forests for use by birds, reptiles, invertebrates, and mammals.

C. Identify and preserve areas with rare plants.

D. Monitor impact of trail users and address negative impacts quickly and effectively.

1. Regular monitoring inspections will be done by the Groton Trails Committee.

E. Monitor and manage for control of invasive plant species.

F. Develop protocol for control of invasives as necessary.

III. *Agriculture - No agricultural activities are anticipated for this parcel.*

IV. *Cultural Resources*

Known cultural resources within MZ 3 currently consist of historic period features including cellar holes, stone walls, and other remains of the past not yet located and analyzed. These include areas of moderate to high archeological potential which may contain remains of currently unknown historic period and prehistoric period archeological sites. A program of resource discovery, protection, and interpretation will allow for the proper stewardship of the cultural resources of MZ 3.

A. Locate and manage prehistoric and historic period archeological resources.
    1. Prepare application for Community Preservation funding to plan and implement an Intensive Archeological Survey IAW 950 CMR 70 in MZ1, 2, and 3.
        a. Obtain an archeological consultant meeting the qualification standards of 950 CMR 70.
        b. Conduct both the Reconnaissance level and Intensive Survey level studies of MZ1, 2, and 3.
        c. Map all discovered archeological sites
B. Prepare protection and management protocols for all discovered sites.
C. Prepare an Unexpected Discoveries protocol for MZ 1, 2, and 3.
D. Plan and implement an Interpretive Plan for the history and archeology of MZ 1, 2, and 3.

V. *Forestry*

The *Surrenden Farm Baseline Documentation Report* acknowledges forestry activities occurred within MZ 3 sometime in the past 15 years. In addition, several red oaks have been cut very recently, evidently as firewood, as the stumps are visible adjacent to the northernmost trail in MZ 3. Undertaking future active forestry practices, under the terms of the Conservation Restriction, will require the preparation of a Forestry Management Plan as in MZ 1. Provisions should be made for keeping the trails open and in their same locations following any logging operations. Consideration will be given to assuring future emergency vehicle access in the layout of any logging activities planned within MZ 3.

VI. *Public Access & Recreation*

The trails of MZ 3 provide recreational opportunities for hunting, fishing, pedestrians, equestrians, bicyclists, cross-country skiers, and snowshoers. The northernmost point of the river trail in MZ 3 cuts upland to avoid the old Groton School boathouse. A modest trail bridge was recently constructed in this area to avoid trampling a sensitive wetland area. Groton School wishes to steer trail users around the non-river side of the new boathouse if they want to continue along the river trail on the Groton Conservation Trust's Sabine Woods property. A second trail connection occurs further east along the Groton School driveway to the boathouse just behind the recreational fields on the main campus. (See Map 12) Note: Trail development and maintenance is subject to written approval of the MA Division of Fisheries & Wildlife.

A. Center trail to River may be closed during deer season (mid-October to December) to ensure a quality hunt. Trails may be closed, moved, or altered as need to protect wildlife, habitat, and natural resources per the Conservation Commission and MA Division of Fisheries & Wildlife.
B. Signs shall be erected regarding dog restrictions at trail entrances from the north (Sabine Woods and Groton School).
C. Access to MZ 3 will be from the parking lot of MZ 2, about 1/3 mile away, or from the parking lot of Groton Place on Route 225 (West Main Street), which is about 1 mile away.
D. Create a loop trail that includes about one-third mile of riverfront trail. This MZ 3 central Loop Trail can be accessed at four points:

1. Northwest: This is where the trail around the Groton School's new boathouse connects Surrenden Farm to the Groton Conservation Trust's Sabine Woods river trail.
2. Northeast: Groton School has recently developed a connecting trail to the western edge of their northernmost athletic fields. From there, the trail connects to the established trail in the New England Forestry Foundation's Sabine Woods land. Continue to explore opportunities for a connecting trail to Farmers Row.
3. Southeast: A short connecting trail from the loop trail provides access to the northeastern part of the fields in MZ 2. From there, users can proceed around the perimeter trail of MZ 2 in either direction.
4. Southwest: A connection via a short trail that provides a route for all users to reach the perimeter trail in MZ 2.

E. Access to MZ 3 will be from the parking lot of MZ 2, about 1/3 mile away, or from the parking lot of Groton Place on Route 225 (West Main Street), which is about 1 mile away.

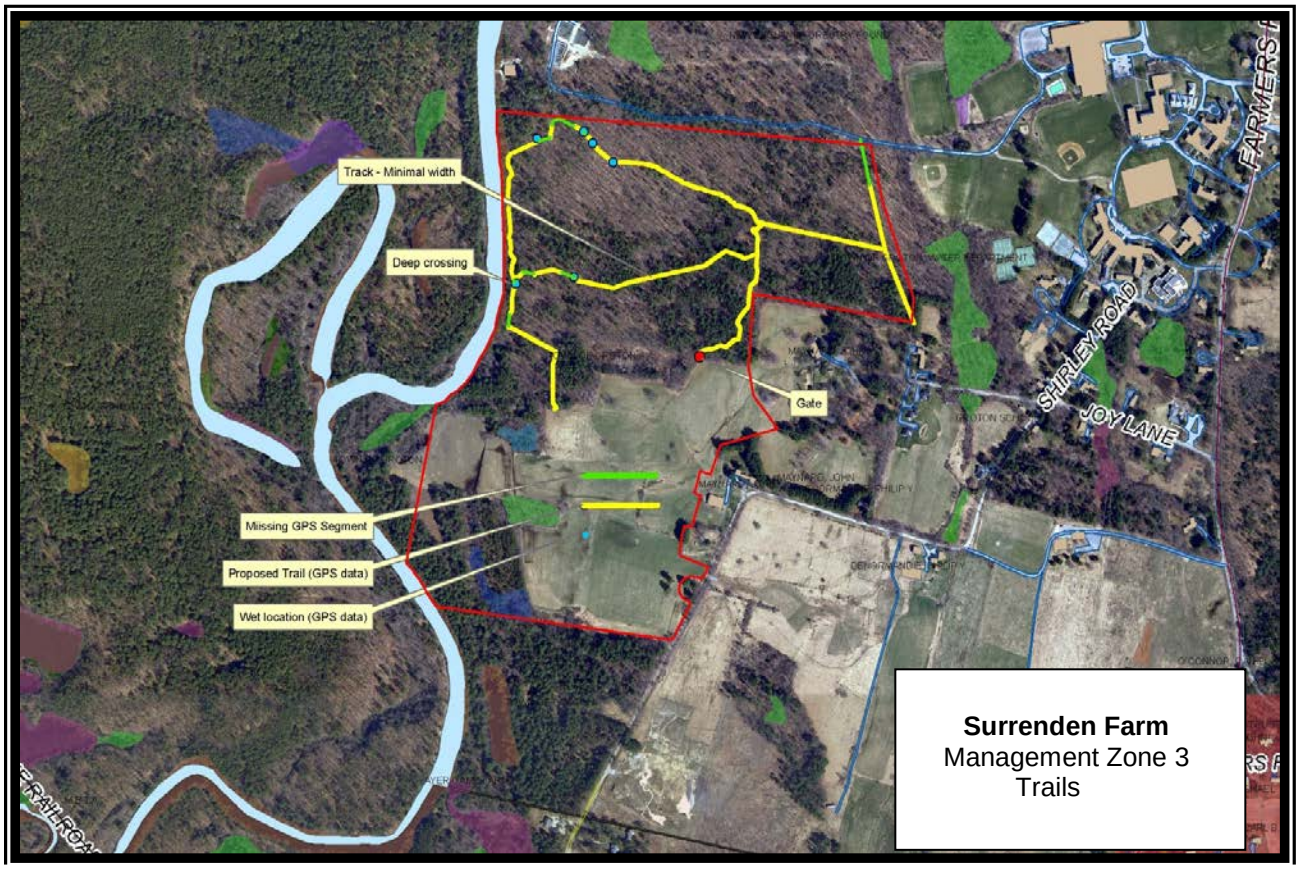
F. Provide access for emergency vehicles via the northern segment of the trail loop (an old dirt road) in MZ 3. The dirt road can be accessed from a driveway on Joy Lane in case of emergency. The road to the Groton School boathouse can also be used by emergency vehicles. Alternatively, emergency vehicles can gain reasonably close access to the southern segment of the trail loop from the field perimeter trail of MZ 2.
   1. Public access to Zone 3 from Joy Lane is not possible because the trail in that area ends on a driveway that is private property. Parking is limited on the Joy Lane cul-de-sac.

D. The trails in MZ 3 provide a trail link for the river trails from the Farmers & Mechanics Conservation Area, Lawrence Woods, Sabine Memorial Woods, and Sabine Woods to MZ 2 and the Groton Conservation Trust property known as The General Field on the east side of Shirley Rd. Trail links are important to equestrian recreation in order to provide the long routes that can be easily traveled by a horse. These trails simultaneously link conservation lands and provide corridors for wildlife travel.

E. Maintenance and marking of trails
   1. Access to certain trails may be restricted during mud season.
   2. As needed, clear trails of large obstructions, i.e., trees or large branches, to prevent users from creating alternative trail pathways.
   3. Maintain typical track width of 4 ft. and 10 ft. height clearance to accommodate equestrians except center trail to the River shall be a single track 2 – 3 ft. wide.
   4. Develop procedures for sectional trail relocation because of wet areas or massive tree fall to preserve or enhance the value for which the trail was established.
   5. Mark trails with both white and green and yellow and green plastic three inch markers provided by the Trails Committee and used within the Groton Trails Network.
   6. Quarterly monitoring by members of the Groton Trails Committee, and other members of the public who will be encouraged to report their findings to the Trails Committee, will be conducted to ensure that all trails within MZ 3 are being appropriately used.

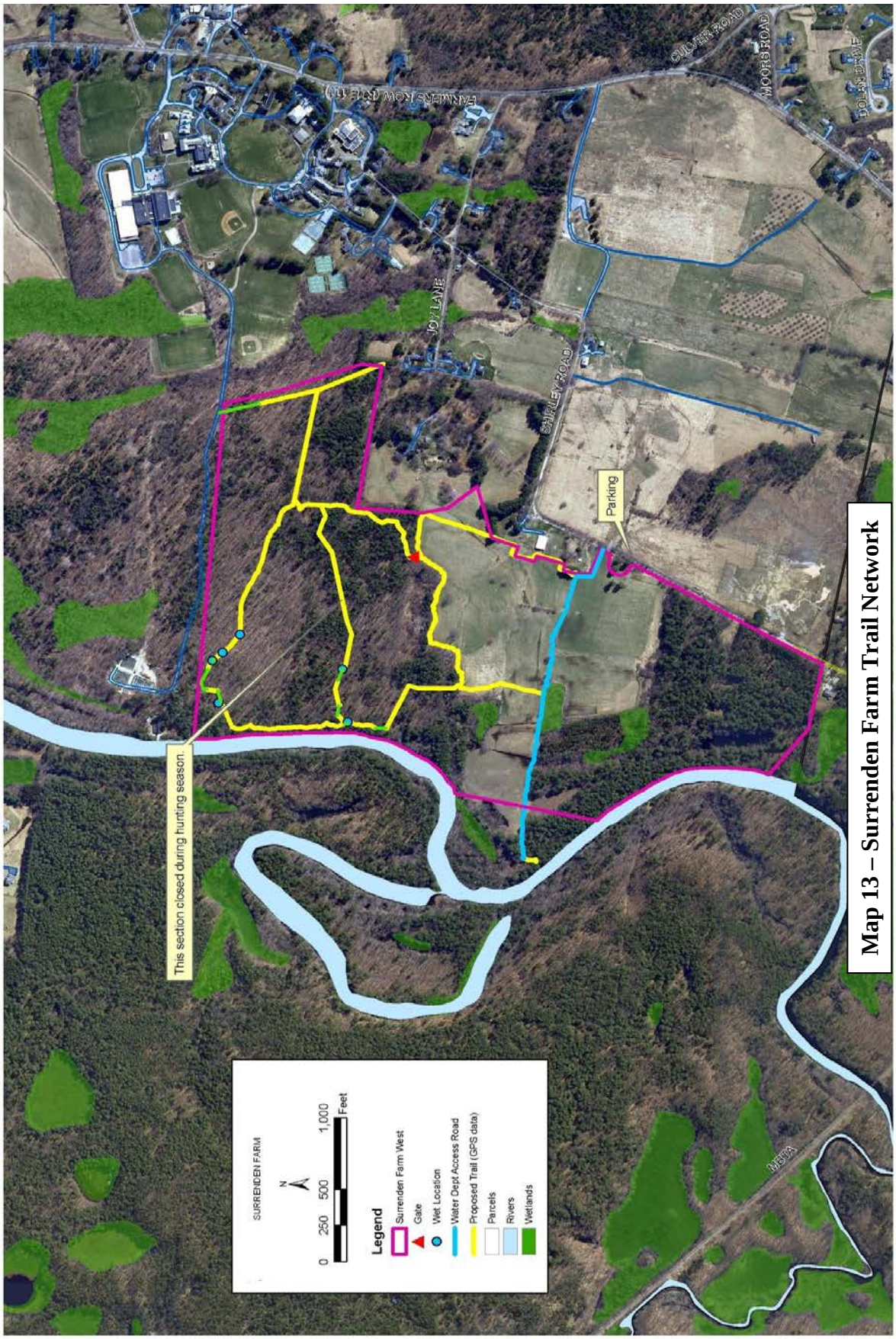
7. In recognition that a large swath of this forested parcel will be open during hunting season, it is acknowledged it may be necessary to close the mid-trail in MZ 3 at that time.

Map 12 – Management Zone 3 Trails



III. *Public Water Supply*

Other than protection of the watershed through sustainable forestry activities, no active public water supply components are anticipated to be located in this area.



Map 13 – Surrenden Farm Trail Network

Appendix A

REGULATIONS FOR USE OF SURRENDEN FARM

It is the intent and policy of the Conservation Commission that conservation land be maintained in a natural state where appropriate and with only limited use of fertilizers, pesticides and herbicides. Application of fertilizers, pesticides, or herbicides by persons other than the Commission's authorized agents shall require the prior written permission of the Commission.

1. All people are welcome to enjoy themselves without charge in these conservation areas of the Town of Groton from ½ hour before sunrise until ½ hour after sunset, unless in the act of hunting in accordance with applicable law.
2. Alcohol and drugs are prohibited on the premises.
3. No cars, trucks, snowmobiles, or other motorized vehicles or powered tools shall be allowed except as permitted by the Groton Conservation Commission.
4. If not posted, areas may be hunted or fished in season with a license and in accord with applicable law.
5. In these areas, no person shall cut, break, remove, deface, defile, or ill-use any structure, fence, and sign or have possession of any part thereof. No growing trees, bushes, plants or flowers shall be defaced or cut, nor shall trails be cut or marked, no dams built nor any structure such as a lean-to, bridge, tower or handrail be constructed, without written authorization of the Conservation Commission and the MA Division of Fisheries & Wildlife.
6. No person shall engage in business, sell or expose for sale, or give away any goods, wares, or circulars without a permit from the Conservation Commission and MA Division of Fisheries & Wildlife approval.
7. No landscape debris, grass clippings, tree cuttings or other similar material or refuse shall be deposited on conservation lands. Trash and litter generated by users shall be removed from the premises when the users depart the premises and shall not be left on the premises in any instance.
8. No personal property or personal landscaping improvements, such as, but not limited to, fences, swing sets, grass sod, sandboxes, irrigation systems, invisible fencing, sheds, vehicles, etc., shall be permitted on conservation lands without previous written authorization from the Conservation Commission and the MA Division of Fisheries & Wildlife..
9. A maximum of two dogs, on leash at all times, may be walked on Surrenden Farm. Owners shall be responsible for picking up and removing dog waste from the site. Dogs undergoing training and in the act of hunting may be allowed off leash with prior written permission from the Conservation Commission.

Violations hereof shall be subject to a penalty of $25.00 for the first offence, $50.00 for the second offense, and $100.00 for the third or subsequent offenses. These regulations are subject to enforcement by the non-criminal disposition method pursuant to Section 1-4 of the Code of the Town of Groton.

Adopted by Groton Conservation Commission 11/25/08

Appendix B

Mowing Advisory Guidelines in Turtle Habitat: Pastures, Successional Fields, and Hayfields

Grasslands, shrublands, pastures, and hayfields are important habitats for turtles, particularly the Wood and Eastern Box Turtle. Turtles require sparsely vegetated areas with some bare soil for nesting and many prefer early successional fields, hayfields, and shrublands as feeding areas during the late spring and summer months. The natural succession of grasslands, shrublands, old pastures, and fields reduces the availability of these critical habitat types forcing turtles to travel longer distances to find similar habitat elsewhere. As the travel distance increase so does the likely hood that they will cross roads putting them at risk of being hit by cars. Therefore, the maintenance of these habitat types is important, often requiring periodic mowing; although other methods of control are possible (e.g. prescribed burns, grazing). Mowing during the spring and summer months can also cause significant turtle mortality; up to 10% of a western Massachusetts population (Jones 2007). In fact researchers are finding that the percent of mortality due to mowing is much higher than the percent of mortality due to roads. The following guidelines are intended to avoid or minimize any detrimental effect of habitat management on Wood or Box Turtle populations. These measures will likely benefit other turtle species, such as the musk turtle and spotted turtle. Native plant communities and all native species, particularly state-listed species, should be considered when developing management plans for conservation lands. These guidelines provide a suite of options, each of which will help reduce turtle mortality. We recognize that all options will not be appropriate for every circumstance and that land managers may need to modify these guidelines to manage sites to accommodate the needs of other species.

For more information about Wood Turtles and Box Turtles and the types of habitat they use see the NHESP Fact Sheets:
Wood Turtle http://www.mass.gov/dfwele/dfw/nhesp/nhfacts/glyptemysinsculpta.pdf
E. Box Turtle http://www.mass.gov/dfwele/dfw/nhesp/nhfacts/tercar.pdf

An information request form can be submitted to the NHESP for persons interested in finding out if they have state-listed turtle species on their property; the form may be found at http://www.mass.gov/dfwele/dfw/nhesp/inforeqform.pdf

For more information on management of these habitats, land managers can refer to the recently released *Managing Grasslands, Shrublands, and Young Forest Habitats for Wildlife: a Guide for the Northeast* available for download at:
http://www.wildlife.state.nh.us/Wildlife/Northeast_Hab_Mgt_Guide.html

For more information about Habitat Management for Amphibians and Reptiles see the *Habitat Management guidelines for Amphibians and Reptiles of the Northeastern United States* available for order at http://www.parcplace.org/habitat_management_guide.html

Lands Managed as Turtle Habitat: Lands where the primary objective is turtle habitat (such as nature preserves, wildlife refuges or private lands where the landowner wish to optimize turtle habitat and abundance).

1) Mowing Rotation – Mowing to maintain field habitat for conservation reasons should only require multi-year rotations (e.g. mowing once every 2-3 years)*. If mowing is combined with another maintenance method such as chemical control** of invading woody plants, mowing during the turtle active season may not be necessary. If periodic mowing is the sole method used for maintenance, woody plant cover on the site will likely increase over the long-term, and mowing during the active season will be necessary to inhibit woody plant invasion. In some years, very frequent mowing may be required to reduce woody plant abundance. If this repeated mowing treatment is required in a given year, vegetation should be mowed frequently enough that it does not provide habitat for turtles in that year, provided that turtle habitat is present adjacent or nearby to mitigate the temporary loss of use of the site

2) Percent Mowed - For sites with > 10 acres of grassland/fields it is recommended that no more than 25%-50% be mowed in any given year. For example, when possible mowing that occurs during the active season should be limited to approximately 25% and areas mowed during the inactive season approximately 50%.

3) Timing - The best solution is to avoiding mowing during the peak time when turtles are using fields.

Peak Time for field use by turtles
May 15th – September 15th

4) Mower Style – If mowing on a multi-year rotation, avoid flail mower heads with guide bars that ride along the ground. Sickle-bar mowers will likely have the least impact if mowing grassland and fields every 1-5 years. In areas with more woody vegetation >1-2" diameter a Brontosaurus-style mower will likely have the least impact on turtles.

5) Mowing Height – If mowing during the active season is necessary, retention of mowing stubble to 7 or even 12 inches will reduce mortality, reduce blade wear, and will leave important cover for animals.

7) *Mower Speed* – Mowing in low gear or at slow speeds will allow turtles to react and move out of the field.

*We recognize that this mowing rotation may be beyond the capacity of the mowing equipment to which a land manager has access. Grant programs are available that may assist in providing funds to assist in hiring a contractor with appropriate mowing equipment, including the NRCS WHIP Program (http://www.nrcs.usda.gov/Programs/whip/) and MassWildlife LIP Program (http://www.mass.gov/dfwele/dfw/dfw_lip.htm). However, these programs are often temporary and intended to recover the capacity of the landowner to manage the property on their own.

** In some cases herbicide applications may be the best alternative to control woody plants and avoid impacts to turtles. Make sure that you read and follow all state and federal regulations. Use the minimum amount and least toxic herbicide possible for desired outcome. Spot application to individual woody plants is preferred. Most of the herbicides used today are amino acid inhibitors acting on amino acids found only in plants. These prevent the plant from performing metabolically.

Land with Multiple Uses: Land where turtles and turtle habitat management is secondary to other management objectives (such as sportsmen's clubs, farmland, recreational areas, etc).

1) Mower Style – If mowing on a multi-year rotation, avoid flail mower heads with guide bars that ride along the ground. Sickle-bar mowers will likely have the least impact if mowing grassland and fields every 1-5 years. In areas with more woody vegetation >1-2" diameter a Brontosaurus-style mower will likely have the least impact on turtles.

2) Blade Height - Elevating the mowing deck height to 7 or even 12 inches (particularly during the 1st haying of the season) will reduce mortality and will leave important cover for animals. Shorter cuts during late summer second hay harvests are less likely to impact turtles.

*Note: It is actually economically wise to mow fields using higher blade heights. The lower portions of the stem have relatively low nutritional value, it reduces blade wear, increases soil moisture retention which can increase yield of the second harvest, and reduces soil erosion (*Saumure 2006*).*

3) Directionality - If mowing during the active season is necessary, start mowing from the center of the field and use a back-and-forth approach, or large circular pattern, to avoid concentrating fleeing animals where they may be killed or stranded. In addition, leave an unmowed 10m strip around the perimeter of the field and mow this area last (see diagram in #5 above). Most turtles are found in these areas and this provides time for them to react to the mowing activity and move out of the area.

There are three exceptions to this rule. The first is when a stream is within 100 m; in these cases it is best to start mowing the side furthest from the streams edge first and work your way towards the stream. The second exception is when the field is bordered by woodland, start mowing the sections of the field furthest from the woods and mow towards the woods. The third exception is when the field is bordered by a road; In this case start mowing the section next to the road first and work your way across the field.

4) *Mower Speed* – Mowing in low gear or at slow speeds will allow turtles to react and move out of the field.

Research Needs:

1) Behavior Data – We need data on the behavioral responses of turtles in reaction to mowers.

2) Blade Height Tests During Actual Field Mowing Events – We need to do tests on the blade height in fields as they are actually being mowed as part of regular maintenance at various sites.
3) The optimum mowing rotation for turtle habitat management.

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Appendix C

Definitions

Natural resources – includes such naturally occurring features as forests, vegetation, fungi, soils, gravel, boulders, animals, and microorganisms in contrast to the built environment which has been constructed or altered by humans.

Cultural resources – artifacts constructed or influenced by humans that include such features as buildings, stone walls, cellar holes, utility lines, drainage structures, roadways, and fencing.

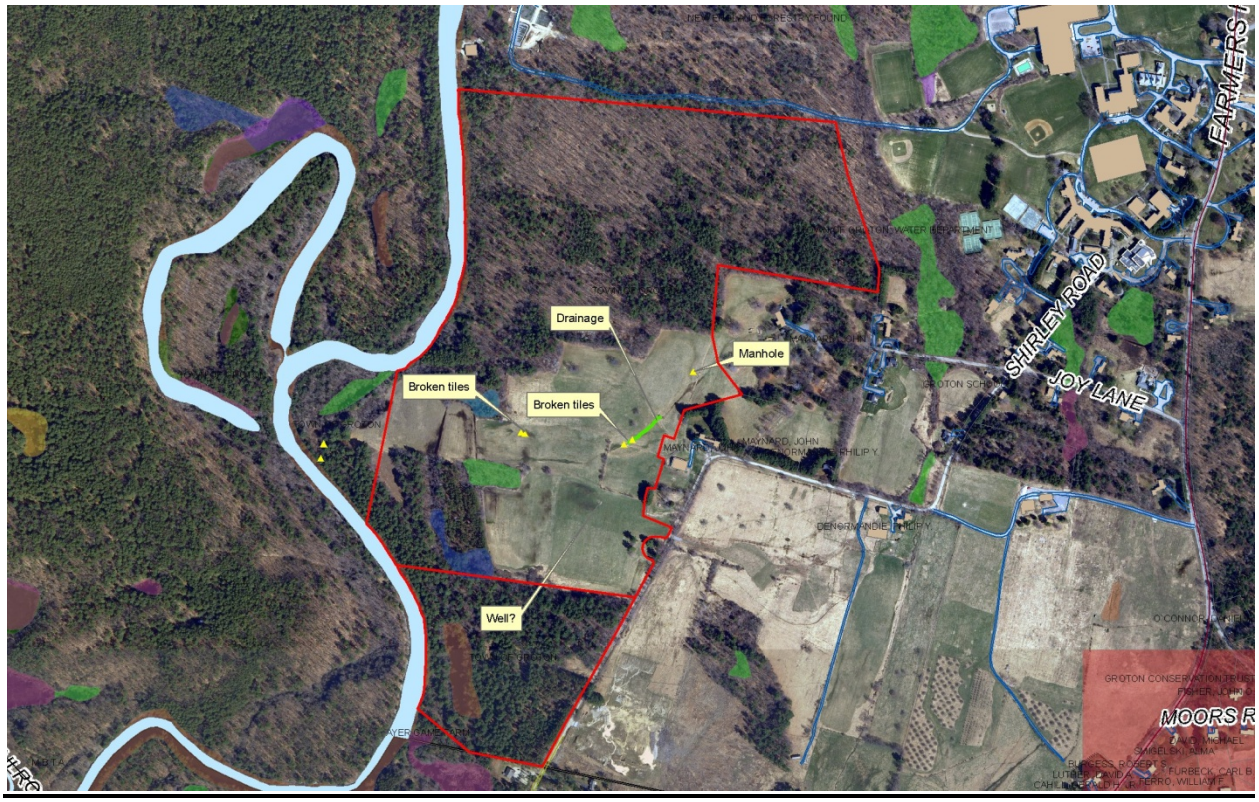
Agricultural resources – includes the raising of crops for human or animal consumption either as food or textiles, cultivation and harvesting of trees, pasturing of livestock, aquaculture, and beekeeping,

Perched – as in perched water table - a saturated layer of soil which is separated from any underlying saturated layers by an unsaturated layer. (*from Soil Science Society of America)*

Sustainable - The basic tenet of sustainable forestry is that the amount of goods and services yielded from a forest should be at a level the forest is capable of producing without degradation of the soil, watershed features or seed source for the future. The concept also assumes that human use will not detract from or degrade the use of forests by other organisms, that human use is ultimately subordinate to healthy ecosystems. The word 'forestry' implies use for human benefit, but to 'sustain' forests means to manage for healthy ecosystems, the by-products of which are "goods and services" like timber, recreation, wildlife and other resources that humans have come to expect from forests. (*from Wikipedia*)

Appendix D

Mapped Drainage Structures MZ 2



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