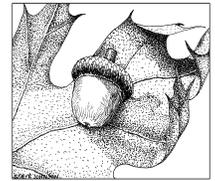




# FOREST MANAGEMENT PLAN

Submitted to: Massachusetts Department of Conservation and Recreation  
For enrollment in CH61/61A/61B and/or Forest Stewardship Program



CHECK-OFFS					Administrative Box		
CH61 cert. <input type="checkbox"/>	CH61A cert. <input type="checkbox"/>	CH61B cert. <input type="checkbox"/>	STWSHP new <input checked="" type="checkbox"/>	C-S EEA <input type="checkbox"/>	Case No. _____	Orig. Case No. _____	
recert. <input type="checkbox"/>	recert. <input type="checkbox"/>	recert. <input type="checkbox"/>	renew <input type="checkbox"/>	Other <input type="checkbox"/>	Owner ID _____	Add. Case No. _____	
amend <input type="checkbox"/>	amend <input type="checkbox"/>	amend <input type="checkbox"/>	Green Cert <input type="checkbox"/>		Date Rec'd _____	Ecoregion _____	
Plan Change: _____ to _____			Conservation Rest. <input type="checkbox"/>		Plan Period _____	Topo Name <u>Fitchburg</u>	
			CR Holder _____		Rare Sp. Hab. _____	River Basin <u>Millers</u>	

## OWNER, PROPERTY, and PREPARER INFORMATION

Property Owner(s) City of Gardner, Gardner Forest Stewardship Committee, c/o Ed Goss

Mailing Address City Hall Room 226, 95 Pleasant Street, Gardner, MA 01440 Phone 978-630-4010

Property Location: Town(s) Gardner Road(s) Green, Eaton, Park, Mathews & Pearl Street

Plan Preparer Gary H. Gouldrup, New England Forestry Cons., Inc. Mass. Forester License # 81

Mailing Address 72 Townsend Street, Pepperell, MA 01463 Phone 978-433-8780

## RECORDS

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch61/61A/61B Excluded Acres	Ch61/61A/61B Certified Acres	Forest Legacy Only		
							Stewardship Excluded Acres	Stewardship Agricultural Acres	Stewardship Acres
*	*	*	*	606.10	0.00	0.00	342.94	0.00	263.16
TOTALS				<b>606.10</b>	<b>NA</b>	<b>NA</b>	<b>342.94</b>	<b>0.00</b>	<b>263.16</b>

### Excluded Area Description(s) (if additional space needed, continue on separate paper)

There are 342.94 acres to be excluded from forest stewardship management. The area includes the Crystal Lake Reservoir (151.14 acres), a golf course and driving range (109.77 acres), a power line right-of-way (5.15 acres), the Gardner High School (48.22 acres), Stump Pond (1.50 acres), a cemetery, parking lots, buildings and other non-forested open space (27.16 acres).

**HISTORY** Year acquired Since 1920's Year management began 1982

Is subdivision plan on file with municipality? Yes  No

Are boundaries blazed/painted /flagged/signs posted? (circle all that apply) Yes  No  Partially

Have forest products been cut within past 2 years? Yes  No

### What treatments have been prescribed, but not carried out (last 10 years if plan is a recert.)?

stand no. NA treatment NA reason NA

(if additional space needed, continue on separate page)

### Previous Management Practices (last 10 years)

Stand #	Cutting Plan #	Treatment	Yield	Value	Acres	Date
<u>6, 7 &amp; 9</u>	<u>NA</u>	<u>Salvage</u>	<u>NA</u>	<u>NA</u>	<u>15+/-</u>	<u>2009-2010</u>

### Remarks: (if additional space needed, continue on separate page)

A Forest Management Plan was prepared for portions of this property in 1982 by the New England Forestry Foundation.  
\* Please See Page # 2 for the Assessor's Map & Lot, Deed Book & Page, and acreage listings.

**RECORDS** (continued)

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch61/61A/61B Excluded Acres	Ch61/61A/61B Certified Acres	Stewardship Excluded Acres	Stewardship Agricultural Acres	Stewardship Acres
Gardner									
R 37	2A-27	UK	UK	59.18	NA	NA	15.81	0.00	43.37
R 37	2-1	UK	UK	5.10	NA	NA	5.10	0.00	0.00
R 37	34-26	UK	UK	157.98	NA	NA	96.81	0.00	61.17
O 29	51-14	UK	UK	46.06	NA	NA	18.80	0.00	27.26
O 26	97-50	UK	UK	164.77	NA	NA	149.84	0.00	14.93
Q 29	21A-8	UK	UK	16.57	NA	NA	1.34	0.00	15.23
R 32	14-3	UK	UK	0.66	NA	NA	0.00	0.00	0.66
Q 28	10A-6	UK	UK	5.69	NA	NA	2.90	0.00	2.79
Q 27	6-8	UK	UK	0.44	NA	NA	0.00	0.00	0.44
P 26	104B-7	UK	UK	1.31	NA	NA	0.00	0.00	1.31
R 32	35-8	UK	UK	37.81	NA	NA	4.82	0.00	32.99
T 28	2-2	UK	UK	46.27	NA	NA	23.84	0.00	22.43
T 28	3-3	UK	UK	31.79	NA	NA	6.42	0.00	25.37
T 28	1-1	UK	UK	13.14	NA	NA	13.14	0.00	0.00
U 27	24-1	UK	UK	16.71	NA	NA	1.50	0.00	15.21
R 29	2-1	UK	UK	2.62	NA	NA	2.62	0.00	0.00
			<b>TOTALS</b>	<b>606.10</b>	<b>0.00</b>	<b>0.00</b>	<b>342.94</b>	<b>0.00</b>	<b>263.16</b>

Owner(s) City of Gardner – Crystal Lake Reservoir

Town(s) Gardner



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## Property Overview, Regional Significance, and Management Summary

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The 263+/-acre Crystal Lake Reservoir Forest is located in an urban section of Gardner along the northern City limits. The Gardner Municipal Golf Course, Crystal Lake Cemetery, the Gardner Water Treatment Facility, and the Garner High School are all lands owned by the City that are adjacent to the forest lands identified in this Plan. Heywood Memorial Hospital, the DCR Skating Rink and the Mount Wachusett Community College are all direct abutters to the property.

The property has been acquired periodically over time since the early 1920's. Forest management activities have been limited to storm damage cleanup and golf course improvements in recent years. A Forest Management Plan was prepared in 1982 by the New England Forestry Foundation, Inc. for over 2,200-acres of land belonging to the City of Gardner. Other nearby lands with long term protection that are owned by the City of Gardner include the Cowee Pond Reservoir (795-acres) and the Perley Brook Reservoir (774-acres). Dunn Pond State Park is located on the southeast side of the property on the south side of Pearl Street.

The property lies in the Miller's River Watershed. Water that passes through the western sections of the property flow directly into Crystal Lake. Water flowing on the eastern sections of the property flow south into Dunn Pond. The property is part of a "Potable Water Supply Watershed" and water quality protection and improvement is very important to the City of Gardner. The City's water treatment facility is located on the southeast side of Crystal Lake.

The forest stewardship land is diverse and consists of mature white pine and oak woodlands (74%), hemlock and mixed hardwoods (8%), forested and open wetland resource areas (11%), red pine plantations (3%) and abandoned fields (4%). White pine, red maple and mixed oaks are the dominant tree species in the upland forest areas. Forested wetlands consist of red maple, spruce, fir, tamarack and hemlock. The timber quality ranges from poor to good throughout the forest. Invasive and non-native vegetation on the property include barberry, buckthorn, bittersweet, autumn olive and honeysuckle. Many of the invasive species can be found growing in the abandoned field (Stand #10) and near the main access roads.

Forest soils on the property include moderately well drained loam and fine sandy loams in the upland areas of the forest (Peru-Marlow-Becket-Skerry-Berkshire-Turnbridge). The low lying drainage areas consist of poorly drained soils (Pillsbury-Peacham-Lyman) and the open wetlands consist of very poorly drained muck (Bucksport-Wonsqueak).

Wildlife habitat is diverse throughout the property. Active beaver flows, vernal pools, ponds, mature woodlands, abandoned fields, and open shrub wetlands provide habitat for numerous native wildlife. The habitat that has drastically declined on the property over the years is the early successional and young forest habitat. Abandoned fields and young forests in the seedling and sapling stages of growth is approximately 4% of the total forest cover on the Crystal Lake Reservoir Forest.

The North Central Path Way runs through a portion of the property. A parking lot is located on the west side of Green Street near the WGAW Radio Station building and radio tower. The path runs southerly between Crystal Lake and the Heywood Memorial Hospital and ends at the DCR Skating Rink at the southeast end of Crystal Lake. The trail is paved and maintained periodically by volunteers and the City of Gardner.



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## Property Overview, Regional Significance, and Management Summary

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A Forest Management Plan has also been prepared for the Gardner’s Cowee Pond Reservoir property and the Perley Brook Reservoir property. The management of the Crystal Lake Reservoir property will reflect many of the same goals and objectives as stated in the Cowee Pond and Perley Brook Reservoir Forest Management Plans. The one exception will be the maintenance and management of the municipal golf course. Aesthetics are extremely important in the areas near and adjacent to the golf course.

The City of Gardner established the Gardner Forest Stewardship Committee in 2010. The Forest Stewardship Committee has developed the following goals for the Crystal Lake Reservoir property:

Management will focus on promoting a healthy forest environment for the safety and enjoyment of the residents of Gardner and others who will visit the property. Watershed protection of Crystal Lake Reservoir and aesthetics around the municipal golf course are essential. The City would like to specifically accomplish the following on this property:

- Enhance both the quality and quantity of future timber products;
- Conduct timber harvests and biomass operations to improve regeneration and aesthetics;
- Enhance wildlife habitat by diversifying tree age and species, creating and maintaining successional “pockets”, and protecting heritage trees.
- Discourage unauthorized ATV access and use on the property.
- Protect the water quality of the Crystal Lake Reservoir Watershed.
- Improve hiking trails for public recreational use.
- Maintain high aesthetics near the Gardner Municipal Golf Course, Heywood Hospital, the North Central Path Way, Gardner High School and the Crystal Lake Cemetery.

Timber resource management will be aimed at enhancing the quality of timber resources into the future while improving wildlife habitats and aesthetics throughout the property. Commercial sales of timber may require whole-tree chipping of low quality trees and portions of trees that do not have firewood or sawtimber products primarily for aesthetic and fire protection purposes.

One of the primary management objectives of Crystal Lake Reservoir property will be to preserve, maintain and improve water quality as a public water resource supply for the residents of Gardner. The Gardner Forest Stewardship Committee has reviewed the Quabbin Reservoir Watershed System Land Management Plan, 2007-2017. The Quabbin Forest Management Objectives can be found on page 144 of the Plan. The Forest Stewardship Committee would like to pursue management of the Crystal Lake Reservoir property as stated in the first paragraph under the “Primary Objectives” (5.2.3.1). *“The primary objective of forest management of the Quabbin (Crystal Lake Reservoir) forest is to create and maintain a complex forest structure, which forms a protective forest cover and a biological filter on the watershed land. This watershed protection forest is designed to be vigorous, diverse in species and age, actively accumulating biomass, conserving ecological and economic values, actively regenerating, and most importantly maintaining a predictable flow of high quality water from the land”.*



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## Property Overview, Regional Significance, and Management Summary

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The Gardner Forest Stewardship Committee will use the Quabbin Plan as a guide when managing the Crystal Lake Reservoir watershed lands.

Management on the Crystal Lake Reservoir Watershed will be approached by using the “*Subwatershed Administration of Forest Management*”. The Quabbin Plan defines a subwatershed on page 145 (5.2.3.21). “A subwatershed is defined in most cases as the land area that drains to a perennial tributary of the reservoir.” The Quabbin Plan defines this management theory on page 146 (5.2.3.2.2). “The general theory behind the use of subwatershed-based planning is to control the proportion of a drainage area that is disturbed by management activities (e.g., logging or road work) during the management period in order to reduce the chances of water quality impacts. This approach is partly based on research on experimental watersheds throughout the eastern US that indicate that until approximately 25-30% of the watershed overstory stocking is harvested (assuming nearly 100% forest cover type), there is no detectable increase in water yield (Hornbeck and Kochenderfer, 2004: Hornbeck et al., 1993). As increases in transport of sediments and nutrients to tributaries and the reservoir are directly related to increases in water yield, it follows that the 25-30% threshold also applies to water quality changes (so long as Conservation Management Practices are in place, the greatest concern is with the movement of nutrients rather than sediments). The same research also demonstrated that water yield generally returns to pre-harvest conditions as the harvested area regenerates – usually within 3-10 years.”

Wildlife habitats will be enhanced through the timber harvesting practices. Creating multiple age classes within the forest will benefit a variety of wildlife species. Artificial nest boxes for wood ducks will be installed in the open water resource areas with emergent vegetation. Patch cutting within the very poor quality white pine stands will be done to create young forest habitat for wildlife. Identifying large “Legacy Trees” will be done to promote “Old Growth” characteristics within the forest where these trees exist and where this practice is applicable. Beaver activities will also be monitored as they may have an impact on water quality.

Creating a scenic vista will also be considered by the City of Gardner around the grounds of the Heywood Hospital. Mayor Mark Hawke has shown interest in creating scenic vistas looking towards Crystal Lake for the patients of Heywood Hospital.

The golf course will continue to be maintained for high aesthetics. Tree harvesting and pruning will be done in the islands of trees within the golf course and along the edges of the golf course for this purpose.

All forest management activities will be sensitive to protecting water quality, soils, cultural resources, wildlife habitats, rare and endangered species and their habitats, aesthetics and recreational values. When harvesting timber resources on the property a Chapter 132 Cutting Plan will be filed with the Department of Conservation and Recreation. The Division of Fisheries and Wildlife’s Natural Heritage & Endangered Species Program (NHESP) will make recommendations to protect any special vegetation or wildlife and their habitats should they exist on the property.

## Landowner Goals

Please **check** the column that best reflects the importance of the following goals:

Goal	Importance to Me			
	High	Medium	Low	Don't Know
Enhance the Quality/Quantity of Timber Products*	X			
Generate Immediate Income		X		
Generate Long Term Income	X			
Produce Firewood		X		
Defer or Defray Taxes			X	
Promote Biological Diversity	X			
Enhance Habitat for Birds	X			
Enhance Habitat for Small Animals	X			
Enhance Habitat for Large Animals	X			
Improve Access for Walking/Skiing/Recreation	X			
Maintain or Enhance Privacy			X	
Improve Hunting		X		
Improve Fishing			X	
Preserve or Improve Scenic Beauty	X			
Protect Water Quality	X			
Protect Unique/Special/ Cultural Areas	X			
Other: Public Education & Outreach	X			

\* This goal must be checked "HIGH" if you are interested in classifying your land under Chapter 61/61A.

1. In your own words please describe your goals for the property:

*The City of Gardner would like to improve and protect the forest resources on the Crystal Lake Reservoir property for the benefit of the residents of Gardner. Protecting the Crystal Lake Reservoir Watershed is a high priority. Maintaining and improving aesthetics near the Gardner Municipal Golf Course, Heywood Hospital, Gardner High School, Crystal Lake Cemetery and the North Central Path Way are extremely important as well. These goals will be accomplished by periodically harvesting timber resources, enhancing wildlife habitat and educating the public on forest stewardship matters.*

### Stewardship Purpose

By enrolling in the Forest Stewardship Program and following a Stewardship Plan, I understand that I will be joining with many other landowners across the state in a program that promotes ecologically responsible resource management through the following actions and values:

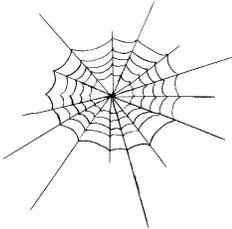
1. Managing for long-term forest health, productivity, diversity, and quality.
2. Conserving or enhancing water quality, wetlands, soil productivity, biodiversity, cultural, historical and aesthetic resources.
3. Following a strategy guided by well-founded silvicultural principles to improve timber quality and quantity when wood products are a goal.
4. Setting high standards for foresters, loggers and other operators as practices are implemented; and minimizing negative impacts.
5. Learning how woodlands benefit and affect surrounding communities, and cooperation with neighboring owners to accomplish mutual goals when practical.

**Signature(s):** \_\_\_\_\_

**Date:** \_\_\_\_\_

## Stewardship Issues

Massachusetts is a small state, but it contains a tremendous variety of ecosystems, plant and animal species, management challenges, and opportunities. This section of your plan will provide background information about the Massachusetts forest landscape as well as issues that might affect your land. **The Stand Descriptions and Management Practices sections of your plan will give more detailed property specific information** on these subjects tailored to your management goals.



**Biodiversity:** Biological diversity is, in part, a measure of the variety of plants and animals, the communities they form, and the ecological processes (such as water and nutrient cycling) that sustain them. With the recognition that each species has value, individually and as part of its natural community, maintaining biodiversity has become an important resource management goal.

While the biggest threat to biodiversity in Massachusetts is the loss of habitat to development, another threat is the introduction and spread of invasive non-native plants. Non-native invasives like European Buckthorn, Asiatic Bittersweet, and Japanese Honeysuckle spread quickly, crowding out or smothering native species and upsetting and dramatically altering ecosystem structure and function. Once established, invasives are difficult to control and even harder to eradicate. Therefore, vigilance and early intervention are paramount.

Another factor influencing biodiversity in Massachusetts concerns the amount and distribution of forest growth stages. Wildlife biologists have recommended that, for optimal wildlife habitat on a landscape scale, 5-15% of the forest should be in the seedling stage (less than 1" in diameter). Yet we currently have no more than 2-3% early successional stage seedling forest across the state. There is also a shortage of forest with large diameter trees (greater than 20"). See more about how you can manage your land with biodiversity in mind in the "Wildlife" section below. (Also refer to *Managing Forests to Enhance Wildlife Diversity in Massachusetts* and *A Guide to Invasive Plants in Massachusetts* in the binder pockets.)

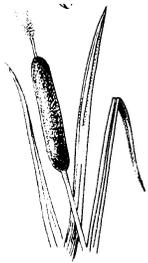


**Rare Species:** Rare species include those that are **threatened** (abundant in parts of its range but declining in total numbers, those of **special concern** (any species that has suffered a decline that could threaten the species if left unchecked), and **endangered** (at immediate risk of extinction and probably cannot survive without direct human intervention). Some species are threatened or endangered globally, while others are common globally but rare in Massachusetts.

Of the 2,040 plant and animal species (not including insects) in Massachusetts, 424 are considered rare. About 100 of these rare species are known to occur in woodlands. Most of these are found in wooded wetlands, especially vernal pools. These temporary shallow pools dry up by late summer, but provide crucial breeding habitat for rare salamanders and a host of other unusual forest dwelling invertebrates. Although many species in Massachusetts are adapted to and thrive in recently disturbed forests, rare species are often very sensitive to any changes in their habitat

Indispensable to rare species protection is a set of maps maintained by the Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) that show current and historic locations of rare species and their habitats. The maps of your property will be compared to these rare species maps and the result indicated on the upper right corner of the front page of the plan. Prior to any

regulated timber harvest, if an occurrence does show on the map, the NHESP will recommend protective measures. Possible measures include restricting logging operations to frozen periods of the year, or keeping logging equipment out of sensitive areas. You might also use information from NHESP to consider implementing management activities to improve the habitat for these special species.



**Riparian and Wetlands Areas:** Riparian and wetland areas are transition areas between open water features (lakes, ponds, streams, and rivers) and the drier terrestrial ecosystems. More specifically, a **wetland** is an area that has hydric (wet) soils and a unique community of plants that are adapted to live in these wet soils. Wetlands may be adjacent to streams or ponds, or a wetland may be found isolated in an otherwise drier landscape. A **riparian area** is the transition zone between an open water feature and the uplands (see Figure 1). A riparian zone may contain wetlands, but also includes areas with somewhat better drained soils. It is easiest to think of riparian areas as the places where land and water meet.

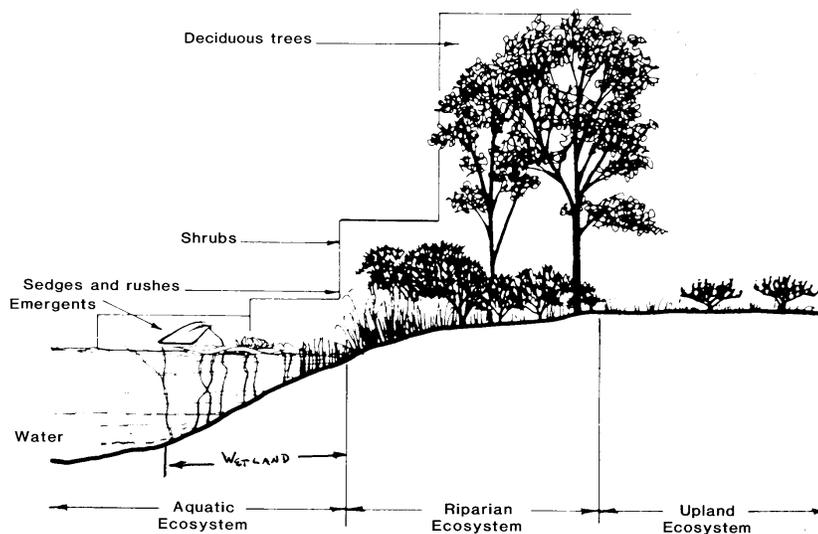


Figure 1: Example of a riparian zone.

The presence of water in riparian and wetland areas make these special places very important. Some of the functions and values that these areas provide are described below:

**Filtration:** Riparian zones capture and filter out sediment, chemicals and debris before they reach streams, rivers, lakes and drinking water supplies. This helps to keep our drinking water cleaner, and saves communities money by making the need for costly filtration much less likely.

**Flood control:** By storing water after rainstorms, these areas reduce downstream flooding. Like a sponge, wetland and riparian areas absorb stormwater, then release it slowly over time instead of in one flush.

**Critical wildlife habitat:** Many birds and mammals need riparian and wetland areas for all or part of their life cycles. These areas provide food and water, cover, and travel corridors. They are often the most important habitat feature in Massachusetts' forests.

**Recreational opportunities:** Our lakes, rivers, streams, and ponds are often focal points for recreation. We enjoy them when we boat, fish, swim, or just sit and enjoy the view.

In order to protect wetlands and riparian areas and to prevent soil erosion during timber harvesting activities, Massachusetts promotes the use of “Best Management Practices” or BMPs. Maintaining or reestablishing the protective vegetative layer and protecting critical areas are the two rules that underlie these common sense measures. DEM’s Massachusetts Forestry Best Practices Manual (included with this plan) details both the legally required and voluntary specifications for log landings, skid trails, water bars, buffer strips, filter strips, harvest timing, and much more.

The two Massachusetts laws that regulate timber harvesting in and around wetlands and riparian areas are the Massachusetts Wetlands Protection Act (CH 131), and the Forest Cutting Practices Act (CH132). Among other things, CH132 requires the filing of a cutting plan and on-site inspection of a harvest operation by a DEM Service Forester to ensure that required BMPs are being followed when a commercial harvest exceeds 25,000 board feet or 50 cords (or combination thereof).



**Soil and Water Quality:** Forests provide a very effective natural buffer that holds soil in place and protects the purity of our water. The trees, understory vegetation, and the organic material on the forest floor reduce the impact of falling rain, and help to insure that soil will not be carried into our streams and waterways.

To maintain a supply of clean water, forests must be kept as healthy as possible. Forests with a diverse mixture of vigorous trees of different ages and species can better cope with periodic and unpredictable stress such as insect attacks or windstorms.

Timber harvesting must be conducted with the utmost care to ensure that erosion is minimized and that sediment does not enter streams or wetlands. Sediment causes turbidity which degrades water quality and can harm fish and other aquatic life. As long as Best Management Practices (BMPs) are implemented correctly, it is possible to undertake active forest management without harming water quality.



**Forest Health:** Like individual organisms, forests vary in their overall health. The health of a forest is affected by many factors including weather, soil, insects, diseases, air quality, and human activity. Forest owners do not usually focus on the health of a single tree, but are concerned about catastrophic events such as insect or disease outbreaks that affect so many individual trees that the whole forest community is impacted.

Like our own health, it is easier to prevent forest health problems than to cure them. This preventative approach usually involves two steps. First, it is desirable to maintain or encourage a wide diversity of tree species and age classes within the forest. This diversity makes a forest less susceptible to a single devastating health threat. Second, by thinning out weaker and less desirable trees, well-spaced healthy individual trees are assured enough water and light to thrive. These two steps will result in a forest of vigorously growing trees that is more resistant to environmental stress.



**Fire:** Most forests in Massachusetts are relatively resistant to catastrophic fire. Historically, Native Americans commonly burned certain forests to improve hunting grounds. In modern times, fires most often result from careless human actions. The risk of an unintentional and damaging fire in your woods could increase as a result of logging activity if the slash (tree tops, branches, and debris) is not treated correctly.

Adherence to the Massachusetts slash law minimizes this risk. Under the law, slash is to be removed from buffer areas near roads, boundaries, and critical areas and lopped close to the ground to speed decay. Well-maintained woods roads are always desirable to provide access should a fire occur.

Depending on the type of fire and the goals of the landowner, fire can also be considered as a management tool to favor certain species of plants and animals. Today the use of prescribed burning is largely restricted to the coast and islands, where it is used to maintain unique natural communities such as sandplain grasslands and pitch pine/scrub oak barrens. However, state land managers are also attempting to bring fire back to many of the fire-adapted communities found elsewhere around the state.



**Wildlife Management:** Enhancing the wildlife potential of a forested property is a common and important goal for many woodland owners. Sometimes actions can be taken to benefit a particular species of interest (e.g., put up Wood Duck nest boxes). In most cases, recommended management practices can benefit many species, and fall into

one of three broad strategies. These are **managing for diversity, protecting existing habitat, and enhancing existing habitat.**

**Managing for Diversity** – Many species of wildlife need a variety of plant communities to meet their lifecycle requirements. In general, a property that contains a diversity of habitats will support a more varied wildlife population. A thick area of brush and young trees might provide food and cover for grouse and cedar waxwing; a mature stand of oaks provides acorns for foraging deer and turkey; while an open field provides the right food and cover for cottontail rabbits and red fox. It is often possible to create these different habitats on your property through active management. The appropriate mix of habitat types will primarily depend on the composition of the surrounding landscape and your objectives. It may be a good idea to create a brushy area where early successional habitats are rare, but the same practice may be inappropriate in the area's last block of mature forest.

**Protecting Existing Habitat** – This strategy is commonly associated with managing for rare species or those species that require unique habitat features. These habitat features include vernal pools, springs and seeps, forested wetlands, rock outcrops, snags, den trees, and large blocks of unbroken forest. Some of these features are rare, and they provide the right mix of food, water, and shelter for a particular species or specialized community of wildlife. It is important to recognize their value and protect their function. This usually means not altering the feature and buffering the resource area from potential impacts.

**Enhancing Existing Habitat** – This strategy falls somewhere between the previous two. One way the wildlife value of a forest can be enhanced is by modifying its structure (number of canopy layers, average tree size, density). Thinning out undesirable trees from around large crowned mast (nut and fruit) trees will allow these trees to grow faster and produce more food. The faster growth will also accelerate the development of a more mature forest structure, which is important for some species. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites.

Each of these three strategies can be applied on a single property. For example, a landowner might want to increase the habitat diversity by reclaiming an old abandoned field. Elsewhere on the property, a stand of young hardwoods might be thinned to reduce competition, while a “no cut” buffer is set up around a vernal pool or other habitat feature. The overview, stand description and management practice sections of this plan will help you understand your woodland within the context of the surrounding landscape and the potential to diversify, protect or enhance wildlife habitat.



**Wood Products:** If managed wisely, forests can produce a periodic flow of wood products on a sustained basis. Stewardship encompasses finding ways to meet your current needs while protecting the forest’s ecological integrity. In this way, you can harvest timber and generate income without compromising the opportunities of future generations.

Massachusetts forests grow many highly valued species (white pine, red oak, sugar maple, white ash, and black cherry) whose lumber is sold throughout the world. Other lower valued species (hemlock, birch, beech, red maple) are marketed locally or regionally, and become products like pallets, pulpwood, firewood, and lumber. These products and their associated value-added industries contribute between 200 and 300 million dollars annually to the Massachusetts economy.

By growing and selling wood products in a responsible way you are helping to our society’s demand for these goods. Harvesting from sustainably managed woodlands – rather than from unmanaged or poorly managed forest – benefits the public in a multitude of ways. The sale of timber, pulpwood, and firewood also provides periodic income that you can reinvest in the property, increasing its value and helping you meet your long-term goals. Producing wood products helps defray the costs of owning woodland, and helps private landowners keep their forestland undeveloped.



**Cultural Resources:** Cultural resources are the places containing evidence of people who once lived in the area. Whether a Native American village from 1,700 years ago, or the remains of a farmstead from the 1800’s, these features all tell important and interesting stories about the landscape, and should be protected from damage or loss.

Massachusetts has a long and diverse history of human habitation and use. Native American tribes first took advantage of the natural bounty of this area over 10,000 years ago. Many of these villages were located along the coasts and rivers of the state. The interior woodlands were also used for hunting, traveling, and temporary camps. Signs of these activities are difficult to find in today’s forests. They were obscured by the dramatic landscape impacts brought by European settlers as they swept over the area in the 17<sup>th</sup> and 18<sup>th</sup> centuries.

By the middle 1800’s, more than 70% of the forests of Massachusetts had been cleared for crops and pastureland. Houses, barns, wells, fences, mills, and roads were all constructed as woodlands were converted for agricultural production. But when the Erie Canal connected the Midwest with the eastern cities, New England farms were abandoned for the more productive land in the Ohio River valley, and the landscape began to revert to forest. Many of the abandoned buildings were disassembled and moved, but the supporting stonework and other changes to the landscape can be easily seen today.

One particularly ubiquitous legacy of this period is stone walls. Most were constructed between 1810 and 1840 as stone fences (wooden fence rails had become scarce) to enclose sheep within pastures, or to

exclude them from croplands and hayfields. Clues to their purpose are found in their construction. Walls that surrounded pasture areas were comprised mostly of large stones, while walls abutting former cropland accumulated many small stones as farmers cleared rocks turned up by their plows. Other cultural features to look for include cellar holes, wells, old roads and even old trash dumps.



**Recreation and Aesthetic Considerations:** Recreational opportunities and aesthetic quality are the most important values for many forest landowners, and represent valid goals in and of themselves. Removing interfering vegetation can open a vista or highlight a beautiful tree, for example. When a landowner's goals include timber, thoughtful forest management can be used to accomplish silvicultural objectives while also reaching recreational and/or aesthetic objectives. For example, logging trails might be designed to provide a network of cross-country ski trails that lead through a variety of habitats and reveal points of interest.

If aesthetics is a concern and you are planning a timber harvest, obtain a copy of this excellent booklet: *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters & Landowners*, by Geoffrey T. Jones, 1993. (Available from the Northeast Regional Agricultural Engineering Service, (607) 255-7654, for \$7). Work closely with your consultant to make sure the aesthetic standards you want are included in the contract and that the logger selected to do the job executes it properly. The time you take to plan ahead of the job will reward you and your family many times over with a fuller enjoyment of your forest, now and well into the future.

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**This is your Stewardship Plan.** It is based on the goals that you have identified. The final success of your Stewardship Plan will be determined first, by how well you are able to identify and define your goals, and second, by the support you find and the resources you commit to implement each step.

It can be helpful and enjoyable to visit other properties to sample the range of management activities and see the accomplishments of others. This may help you visualize the outcome of alternative management decisions and can either stimulate new ideas or confirm your own personal philosophies. Don't hesitate to express your thoughts, concerns, and ideas. Keep asking questions! Please be involved and enjoy the fact that you are the steward of a very special place.



**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	1	MD	5.44	7.4" DBH Wetland Open Marsh	20 sqft	4.1 Cords	50 (RM)

This wetland resource area is understocked with scattered red maple poles and saplings. Many areas have been flooded due to beaver activities. Dead snags are scattered in the northern sections of the stand. There are pockets and small groups of red maple, white pine, spruce, hemlock and fir trees in the pole and small sawtimber class within and along the drier sections of the area. Some areas are open and vegetated with alders, winterberry, cattails, grasses and other wetland shrubs and plants. The area is flat and hummocky with very poorly drained organic soils (Bucksport-Wonsqueak Muck). The soils are not capable of producing high quality timber resources due to the high water table. Management will focus on wildlife habitat enhancement by installing wood duck boxes. The desired future condition is an area that provides habitat for wildlife and protects wetland and water resources.

STEW	2	HH	8.86	10.6" DBH Sawtimber-Pole	160 sqft	4,751 BF & 35.0 Cds	57 (HM)
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Hemlock, red maple, white pine, red pine, red oak, spruce, beech, black cherry and other mixed hardwoods can all be found in this overstocked sawtimber and pole sized stand. The hemlock component tends to be poor to fair in timber quality. The red oak and white pine stems are fair to good in form and timber quality. Scattered hemlock and mixed hardwood saplings are present in the understory but development is limited due to the dense overstory canopy and pockets of mountain laurel. The area is gently sloped and rocky in spots with moderately drained loam soils (Peru-Marlow). The soils are capable of producing high quality timber resources. Management will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife.

STEW	3	WH	14.35	10.7" DBH Pole-Sawtimber	130 sqft	8,786 BF & 22.5 Cds	60 (WP)
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White pine and mixed hardwoods dominate the overstory in this well stocked sawtimber and pole sized stand. The white pine stems are poor to good in form and timber quality. The mixed hardwoods include red maple, red oak, beech, birch, aspen, white ash, and sugar maple poles and sawtimber of poor to good form and timber quality. Scattered hemlock trees are present as well. The area was harvested approximately 25-30 years ago. Forest regeneration is scattered and includes white pine, hemlock and mixed hardwood saplings. Mountain laurel can be found in the understory as well. The area is gently to moderately sloped with moderately drained loam soils (Peru-Marlow). The forest soils are capable of producing high quality timber resources. Management will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

OBJECTIVE CODE: CH61 = stands classified under CH61/61A      STEW= stands not classified under CH61/61A  
 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	4	WH	11.08	8.3" DBH Pole-Sawtimber	100 sqft	7,000 BF & 14.4 Cds	60 (WP)

White pine and mixed hardwoods dominate the overstory in this well stocked sawtimber and pole sized stand. Stand density, species composition and size class varies throughout the area. The white pine stems are poor to good in form and timber quality. The mixed hardwoods include red maple, red oak, beech, birch, aspen, white ash, and sugar maple poles and sawtimber of poor to good form and timber quality. Scattered hemlock trees are present as well. The area was harvested approximately 25-30 years ago. Forest regeneration is scattered and includes white pine, hemlock and mixed hardwood saplings. Mountain laurel can be found in the understory as well. The area is gently to steeply sloped with moderately well drained loam soils (Peru-Berkshire-Marlow). The forest soils are capable of producing high quality timber resources. Management will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

STEW	5	MH	3.64	5.0" DBH Pole	50 sqft	100 BF & 6.4 Cds.	60 (MH)
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This is a mixed hardwood stand comprised of red maple, oak, white birch, black birch, black cherry, white ash, beech and yellow birch . Areas in the wetland resource areas are primarily stocked with red maple. Scattered spruce and white pine poles and small sawtimber are present near the driving range and parking lot. Mixed hardwood saplings are the primary source of regeneration. The area is flat to gently sloped and rocky with poorly to moderately drained loam soils (Berkshire-Marlow) capable of producing high quality timber resources. No management is recommended at this time. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

STEW	6	RP	7.05	10.3" DBH Small Sawtimber	140 sqft	11,529 BF & 19.1 Cds	63 (WP)
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Red Pine is the primary species in this overstocked sawtimber sized plantation that was storm damaged in 2008. The red pine is fair to good in form and timber quality with several pockets that have been severely damaged due to the 2008 ice storm. Scattered red oak, white pine and mixed hardwood poles and sawtimber can also be found. Forest regeneration is scattered and includes white pine and mixed hardwood saplings. There are two primary locations of the red pine plantation. These two areas are located in Compartment #9 in and along the edge of the municipal golf course. The area is gently sloped with moderately well drained loam soils (Marlow). The forest soils are capable of producing high quality timber resources. Management will focus on storm damage cleanup and thinning for aesthetic improvements near the golf course. The desired future condition is a stand that is growing high quality timber resources while providing good aesthetics for the golf course.

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 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	7	WO	16.28	13.1" DBH Sawtimber-Pole	132 sqft	6,020 BF & 27.3 Cds	60 (WP)

White pine, red oak and mixed hardwoods dominate the overstory in this adequately stocked sawtimber and pole sized stand. Species composition, stand density and size class varies throughout these areas that are situated in and along the edge of the golf course. The white pine stems are poor to good in form and timber quality with black knotted timber being common throughout the stand. The red oak stems are generally fair to good in form and timber quality. Portions of this area were severely damaged by the ice storm in 2008. Salvage operations, aesthetic thinning and pruning have all been conducted by the golf course management in the past. Forest regeneration is scattered and includes white pine and mixed hardwood saplings. The area is flat to moderately sloped and rocky in spots with moderately well drained loam soils (Marlow). The forest soils are capable of producing high quality timber resources. Management in the future will focus on aesthetic thinning and pruning. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while being aesthetically pleasing for the golf course.

STEW	8	OH	18.28	9.4" DBH Pole-Small Sawtimber	120 sqft	3,900 BF & 22.2 Cds	60 (RO)
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Red oak and mixed hardwoods dominate the overstory in this well stocked sawtimber and pole sized stand. The red oak stems are generally well formed and fair to good in form and timber quality. The mixed hardwood component includes red maple, white ash, sugar maple, black cherry, and birch poles and sawtimber of poor to fair form and timber quality. Scattered white pine and hemlock poles and sawtimber sized stems are present as well. Mixed hardwood, hemlock and white pine saplings are the primary source of regeneration. Mountain laurel and witch hazel are also present in the understory. The area is gently to moderately sloped with moderately well drained loam soils (Peru-Marlow) capable of producing high quality timber resources. Management will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while maintaining good aesthetics for the golf course and protecting the Crystal Lake Reservoir Watershed.

STEW	9	OH	5.29	8.0" DBH Pole-Sawtimber	30 sqft	250 BF & 6.0 Cds	60 (RO)
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Mixed hardwoods dominate the overstory of this stand that was aggressively harvested for the purpose of improving the amount of sunlight reaching the turf of the golf course along the fairways. Red oak, sugar maple, red maple, beech, white ash, white birch, black cherry and yellow birch poles and sawtimber of poor to good form and timber quality can all be found in the overstory. The area was harvested within the last three years. Forest regeneration is adequate and is comprised of mixed hardwood seedlings and saplings. The area is gently sloped and rocky with moderately well and somewhat poorly drained stony soils (Pillsbury-Peacham). The forest soils are capable of producing high quality timber resources. Management will focus on improving aesthetics and developing crop trees that will allow filtered sunlight to reach the golf course fairways. The desired future condition is a stand of trees that will allow sunlight to reach the golf course fairways and provide good aesthetics.

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 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	10	AF	9.02	3.8" DBH Sapling-Small Pole	10 sqft	1.0 Cords	60 (WP)

This area is an abandoned field and early succession wildlife habitat site located near the WGAW radio station and tower. White pine, aspen, black cherry, red maple, mixed oaks, apple, white ash and birch saplings and poles can all be found scattered throughout the area. Areas adjacent to the radio tower are mostly open and vegetated with grasses and shrubs. Alders, staghorn sumac, bittersweet, highbush blueberry, honeysuckle, wild raspberry, buckthorn, grasses and other abandoned field vegetation are growing on the site. The area is flat to gently sloped with moderately well drained loam soils (Peru). The forest soils are capable of producing high quality timber resources. Management will focus on wildlife habitat enhancement in the years to come by clearing undesirable vegetation and promoting early successional habitat for wildlife. This type of management may not be done in this ten year management period. The desired future condition is a stand that continues to provide habitat for early successional forms of wildlife.

STEW	11	WO	29.48	12.6" DBH Sawtimber-Pole	160 sqft	15,135 BF & 24.6 Cds	60 (WP)
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White pine, red oak and mixed hardwoods dominate the overstory in this adequately stocked sawtimber and pole sized stand. Species composition, stand density and size class varies throughout the area. The white pine stems are poor to good in form and timber quality while the red oak stems are generally fair to good in form and timber quality. Other mixed hardwoods in the stand include red maple, beech, birch, and black cherry. Forest regeneration is scattered and includes white pine and mixed hardwood saplings. Witch hazel and mountain laurel can also be found. The area is flat to moderately sloped with moderately well drained loam soils (Peru-Marlow). A few areas tend to be seasonally wet and poorly drained. The forest soils are capable of producing high quality timber resources. Management in the future will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

STEW	12	MD	4.67	6.0" DBH Wetland Resource Area	20 sqft	3.4 Cords	50 (RM)
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This wetland resource area is understocked with scattered red maple poles. Some areas are open and vegetated with alders, winterberry, highbush blueberry, ironwood, grasses and other wetland shrubs and plants. The area is flat and hummocky with very poorly drained organic soils (Bucksport-Wonsqueak Muck). The soils are not capable of producing high quality timber resources due to the high water table. Management will focus on wildlife habitat enhancement by installing wood duck boxes. The desired future condition is an area that provides habitat for wildlife and protects wetland and water resources.

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 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	13	WO	29.86	10.9" DBH Pole-Sawtimber	120 sqft	9,546 BF & 18.9 Cds	63 (RO)

White pine, red oak and mixed hardwoods dominate the overstory in this adequately stocked sawtimber and pole sized stand. Species composition, stand density and size class varies throughout the area. The white pine stems are poor to good in form and timber quality while the red oak stems are generally fair to good in form and timber quality. Other mixed hardwoods in the stand include red maple, beech, birch, white ash, and black cherry. Pockets of planted red pine poles and sawtimber can be found along the edges of Crystal Lake. Forest regeneration is scattered and includes white pine and mixed hardwood saplings. Witch hazel and mountain laurel are also present. The North Central Path Way runs through the center of this forest type. The area is gently to moderately sloped with moderately well drained loam soils (Peru-Marlow-Berkshire-Turnbridge-Lyman). The forest soils are capable of producing high quality timber resources. Management in the future will focus on improvement thinning by selection harvesting and scenic vista clearings around the Heywood Hospital grounds. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing scenic vistas for the hospital and protecting the Crystal Lake Reservoir Watershed.

STEW	14	MH	1.24	2.9" DBH Sapling-Small Pole	40 sqft	1.8 Cords	60 (RO)
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Aspen, white ash, black cherry, red maple, birch, and red oak saplings and small poles can all be found growing in this early successional forest type. The stand is adequately stocked. Bittersweet, honeysuckle, wild raspberry and Japanese bamboo can be found growing in the understory. The area is gently to steeply sloped with moderately well drained loam soils (Peru-Marlow). The forest soils are capable of producing high quality timber resources. No management is recommended at this time. The area will be allowed to develop over the next ten years. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

STEW	15	WO	15.62	14.2" DBH Sawtimber	170 sqft	19,326 BF & 22.9 Cds	65 (WP)
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White pine and red oak are the dominant overstory in this overstocked sawtimber sized stand. The white pine stems are poor to good in form and timber quality while the red oak stems are generally fair to good in form and timber quality. Other mixed hardwoods in the stand include red maple, beech, birch, and black cherry. Forest regeneration includes white pine and mixed hardwood saplings. Witch hazel and mountain laurel can also be found. The area is flat to moderately sloped with moderately well drained fine sandy loam soils (Skerry). A few areas tend to be seasonally wet and somewhat poorly drained. The forest soils are capable of producing high quality timber resources. The Wachusett Community College campus is located directly north of this stand on the north side of Mathews Street. Management in the future will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while maintaining good aesthetics and protecting the Crystal Lake Reservoir Watershed.

OBJECTIVE CODE: CH61 = stands classified under CH61/61A      STEW= stands not classified under CH61/61A  
 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**STAND DESCRIPTIONS**

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	16	MS	16.38	4.8" DBH Wetland Resource Area	20 sqft	3.0 Cds	50 (RM)

This is a wetland resource area that is variably stocked with trees. Pockets of red maple, spruce, fir, hemlock and white pine can all be found. Some areas are open and vegetated with alders, winterberry, highbush blueberry, ironwood, cattails, grasses and other wetland shrubs and plants. The area is flat and hummocky with very poorly drained organic soils (Bucksport-Wonsqueak Muck). The soils are not capable of producing high quality timber resources due to the high water table. Management will focus on wildlife habitat enhancement by installing wood duck boxes. The desired future condition is an area that provides habitat for wildlife and protects wetland and water resources.

STEW	17	HH	12.94	9.8" DBH Sawtimber-Pole	170 sqft	8,023 BF & 30.8 Cds.	57 (HM)
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Hemlock, red maple, red oak, and red maple are the dominant overstory species in this overstocked sawtimber and pole sized stand. Scattered white pine, sugar maple, beech and black cherry poles and sawtimber can also be found. The overall timber quality is poor to fair. Scattered hemlock and mixed hardwood saplings are the primary source of regeneration in the understory. The area is flat to moderately sloped and rocky in spots with well to somewhat poorly drained fine sandy loam soils (Becket-Skerry). The soils are capable of producing high quality timber resources. No management is recommended at this time although some areas may be thinned when harvesting is conducted in Stand #18. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protection of the Crystal Lake Reservoir Watershed.

STEW	18	OH	53.68	10.8" DBH Sawtimber	108 sqft	6,795 BF & 17.9 Cds	65 (RO)
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Red oak is the dominant overstory species in this well stocked sawtimber and pole sized stand. The red oak stems are generally well formed and fair to good in form and timber quality. The mixed hardwood component includes red maple, white ash, sugar maple, black cherry, and birch poles and sawtimber of poor to fair form and timber quality. Scattered white pine and hemlock poles and sawtimber sized stems are present as well. Mixed hardwood, hemlock and white pine saplings are the primary source of regeneration. Mountain laurel and witch hazel are also present in the understory. The area is gently to moderately sloped with well to moderately well drained fine sandy loam soils (Becket-Skerry) capable of producing high quality timber resources. A few areas are seasonally wet and somewhat poorly drained. Management will focus on improvement thinning by selection harvesting. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing habitat for wildlife and protecting the Crystal Lake Reservoir Watershed.

OBJECTIVE CODE: CH61 = stands classified under CH61/61A      STEW= stands not classified under CH61/61A  
 STD= stand    AC= acre    MSD= mean stand diameter    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Timber Management***

*The following timber harvesting recommendations have been made based on the “Subwatershed Administration of Forest Management”. The target is to conduct timber harvesting on approximately 25-30% of the total forest land area within this ten year management period. The proposed areas may change based on priority, markets, storm damage, disease and insect damage, and landowner goals for the property.*

STEW 2 HH Selection Harvest 8+/- 40 sqft 15 MBF 2012-2021  
Improvement Thin & 200 Tons

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/4 -1/3 of the overstory volume. The emphasis will be to harvest mature hemlock and mixed hardwood sawtimber (16” DBH+) in order to improve the growing conditions of the developing high quality hemlock, white pine and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality hemlock and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Harvesting will prepare the site for new production in the understory where very little exists at this time. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

STEW 3 & 4 WH Selection Harvest 25+/- 35 sqft 63 MBF 2012-2021  
Improvement Thin & 630 Tons

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/4 -1/3 of the overstory volume. The emphasis will be to harvest mature white pine and mixed hardwood sawtimber (16” DBH+) in order to improve the growing conditions of the developing high quality white pine and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality white pine and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A) STEW= Stewardship Program practices  
STD= stand Type= Forest type AC= acre MBF= thousand board feet BA= basal area VOL= volume

Owner(s) City of Gardner – Perley Brook Reservoir Town(s) Gardner

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Timber Management***

STEW 8 OH Selection Harvest 5+/- 40 sqft 15 MBF 2012-2021  
Improvement Thin & 1,500 Tons

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/3 of the overstory volume. The emphasis will be to harvest both mature red oak and mixed hardwood sawtimber (16" DBH+) as well as small diameter sawlogs and pulp/firewood sized stems (6-15.9" DBH+) in order to improve the growing conditions of the developing high quality red oak poles and small sawtimber sized stems. Poorly formed and low stems of all sizes will also be harvested to improve the health and productivity of the stand. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. Aesthetics along the golf course are very important for this harvest. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the low quality hardwood trees will be sold as firewood.

STEW 11 WH Selection Harvest 25+/- 45 sqft 80 MBF 2012-2021  
Improvement Thin & 1,000 Tons

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/4 -1/3 of the overstory volume. The emphasis will be to harvest mature white pine, red oak and mixed hardwood sawtimber (16" DBH+) in order to improve the growing conditions of the developing high quality white pine, red oak and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality white pine and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

Continued .....

OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A) STEW= Stewardship Program practices  
STD= stand Type= Forest type AC= acre MBF= thousand board feet BA= basal area VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir Town(s) Gardner

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Timber Management***

STEW	15	WH	Selection Harvest Improvement Thin	15+/-	45 sqft	70 MBF & 450 Tons	2012-2021
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Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/3 of the overstory volume. The emphasis will be to harvest mature white pine and mixed hardwood sawtimber (16" DBH+) in order to improve the growing conditions of the developing high quality white pine and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality white pine and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. The stand is directly opposite the entrance to the Mount Wachusett Community College. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

STEW	17	HH	Selection Harvest Improvement Thin	12+/-	45 sqft	20 MBF & 400 Tons	2012-2021
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Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/4 -1/3 of the overstory volume. The emphasis will be to harvest mature hemlock and mixed hardwood sawtimber (16" DBH+) in order to improve the growing conditions of the developing high quality hemlock, white pine and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality hemlock and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Harvesting will prepare the site for new production in the understory where very little desired regeneration exists at this time. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. This will be very important in the areas around the Gardner High School grounds. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

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OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A)      STEW= Stewardship Program practices  
 STD= stand    Type= Forest type    AC= acre    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Timber Management***

STEW	18	OH	Selection Harvest Improvement Thin	50+/-	30 sqft	60 MBF & 1,250 Tons	2012-2021
------	----	----	---------------------------------------	-------	---------	------------------------	-----------

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/3 of the overstory volume. The emphasis will be to harvest mature red oak, white pine and mixed hardwood sawtimber (16" DBH+) in order to improve the growing conditions of the developing high quality red oak, white pine and mixed hardwood poles and small sawtimber sized stems. Poorly formed and low quality white pine and mixed hardwood stems of all sizes will also be harvested to improve the health and productivity of the stand. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. The recommendation is to have a harvesting firm that is capable of chipping the tops of trees and very poor quality trees in order to reduce fire hazards and improve the aesthetics of the harvest area. High value sawtimber will be sold as sawlogs, while the low quality trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. A portion of the poor quality hardwoods will be sold as firewood.

***Aesthetic Tree Management & Golf Course Maintenance***

STEW	6, 7, 9	OH	Improvement Thin Shade Tree Mgt.	28+/-	NA	NA	2012-2021
------	---------	----	-------------------------------------	-------	----	----	-----------

The stands within and along the edges of the Gardner Municipal Golf Course will be managed primarily for the purpose of improving aesthetics and shade tree management. Tree harvesting has been conducted in the past within these areas to improve the amount of sunlight reaching the golf course fairways and greens. Tree harvesting and pruning will continue to be pursued by the golf course maintenance department. The red pine stands in particular will require salvage operations to remove the remaining trees that were destroyed in the ice storm of 2008. The golf course maintenance department will also consider having these stands thinned by professional timber harvesting companies that will eventually be purchasing timber that is sold in Stands 8, 11 and 13. The professional timber harvester would be required to have whole-tree chipping equipment when harvesting timber in Stands 6, 7 and 9. Ground conditions would need to be frozen to avoid damage to the golf course fairways. Combining commercial timber harvesting and golf course maintenance projects may be the best financial option for the golf course. No recommended harvest volumes will be made at this time. The Forest Stewardship Committee and the golf course maintenance department will determine where and when these projects will be pursued at a later date.

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OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A)      STEW= Stewardship Program practices  
 STD= stand    Type= Forest type    AC= acre    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner  
 Page 22 of 33

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Biological Diversity***

STEW 1-18 All Invasive Species Control 263+/- NA NA 2012-2021

The Forest Stewardship Committee is interested in promoting biological diversity on the property. Eliminating invasive and non-native trees, plants and shrubs will be done where these species exist and when economically feasible and practical. Buckthorn, bittersweet, honeysuckle, Norway maple, Japanese bamboo and Japanese barberry are known to be growing on the property. The heaviest concentrations of invasive species growth can be found in the abandoned fields in Stand 10 and Stand 14. Cutting the stems with saws will help reduce and control the spread of the invasive species. Controlling the invasive species through well timed timber management activities is another management tool. Encouraging vigorous growth of native tree species in the forest understory will be accomplished by scarifying the soil prior to seed dissemination. Another biodiversity issue is the distribution of forest growth stages. Trying to maintain multiple forest age and size classes on the property will also be pursued by the landowner on this property through periodic timber harvests and wildlife habitat management. Please see the Biological Diversity issues on page #6 for more details.

***Wildlife Habitat Enhancement***

STEW 1, 12, 16 Artificial Nest Boxes 26+/- NA NA 2012-2021  
Wood Duck

These wetland resource areas provide habitat for **wood ducks**. The open water and emergent vegetation within these areas are important for the development of young wood ducks. The boxes should be set up approximately four feet above open water on cedar, or metal poles to protect the young and eggs from predators. The boxes should also be set up over water that is 1-4 feet deep. The boxes should be cleaned every year and new bedding placed on the bottom of the box. The Division of Fisheries and Wildlife can provide further information about the box dimensions, installation, and maintenance. The recommendation is to install no more than one (1) box in each area on an experimental basis.

Timber harvesting practices alone will enhance wildlife habitat. Creating an unevenaged forest structure while maintaining a variety of forest types and vegetation will greatly increase the diversity of wildlife species using this property for food, protection, mating and nesting. For more information on wildlife management please refer to "*Enhancing Wildlife Habitats; A Practical Guide For Forest Landowners*". Please also see the Timber Management recommendations on pages 24-27.

Continued .....

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Wildlife Habitat Enhancement***

STEW 10 AF Early Successional Mgt. 22+/- NA NA 2012-2021  
Undesirable Vegetation Control

Management in this abandoned field will be aimed at re-claiming and maintaining young forest habitat for wildlife. Trees that have matured into the small pole and sawtimber class will be cleared to promote new growth that will provide cover, nesting grounds and food sources for early successional wildlife which include roughed grouse, American woodcock, turkey, cottontail rabbit, American kestrel and song birds to name just a few. Apple trees will be released to enhance their health, vigor and fruit production. Several trees that have benefit to wildlife will be retained within the abandoned field when the clearing is done. These trees include aspen, black cherry, hickory and mixed oaks. Highbush blueberry and other berry producing shrubs will be retained as well. This practice will be timed with timber harvesting activities that are conducted in Stand 8 and 13.

***Boundary Maintenance***

STEW All All Blaze & Paint 263+/- NA NA 2012-2021

Abutting property surveys and existing deeds for the property will be used to identify the unknown property lines. Blazing and painting the property lines should be done prior to any timber harvesting activities. Many of the property lines and corners were identified and painted during the field inventory in 2011. Iron pipes, stone bounds and wire fences that were found have been indicated on the boundary maps on pages 30-32.

***Scenic Vista***

STEW 13 WO Group Selection & Patch Cut 5+/- NA NA 2012-2021

The City of Gardner, in cooperation with the Heywood Hospital, would like to create a scenic vista for the patients and staff of the Heywood Hospital that overlooks Crystal Lake Reservoir. This project would occur west of the hospital grounds and east of the North Central Path Way. Currently, views to the lake are limited due to a dense forested canopy. The tree cutting would most likely involve work on steep slopes. Mitigation measures to prevent erosion and water runoff will need to be determined prior to starting the project.

OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A) STEW= Stewardship Program practices  
STD= stand Type= Forest type AC= acre MBF= thousand board feet BA= basal area VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir Town(s) Gardner

**MANAGEMENT PRACTICES**  
*to be done within next 10 years*

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

***Recreation Enhancement &  
Forest Stewardship Education***

STEW	All	All	Trail Construction & Maintenance Forest Stewardship Education	263+/-	NA	NA	2012-2021
------	-----	-----	--	--------	----	----	-----------

Creating new trails and maintaining the existing trails will be done for the safety and enjoyment of the residents of Gardner and general public. New trail sites will be selected as the landscape, topography and wetland water resources permit. Trail markers, self guided maps and interpretive signs will all be used to guide and educate the public on forest stewardship issues pertaining to this forest. Public site walks, local media and City Hall meetings will all be useful when educating the residents of Gardner about the management practices in this Plan and forest stewardship in general.

There are many opportunities available on this forest to educate the public on forest stewardship matters. The property is visited often by the public. Golfers, students of Mount Wachusett Community College, students of the Gardner public schools, Gardner residents and the general public visit this property more than any of the other City owned forest lands.

The North Central Path Way (Rail Trail) will continue to be maintained and improved by volunteers and the City of Gardner on lands owned by the City.

*All forest management activities will be sensitive to protecting water quality, soils, cultural resources, wildlife habitats, rare and endangered species and their habitats, aesthetics and recreational values. When harvesting timber resources on the property a Chapter 132 Cutting Plan will be filed with the Department of Conservation and Recreation. The Division of Fisheries and Wildlife’s Natural Heritage & Endangered Species Program (NHESP) will make recommendations to protect any special vegetation or wildlife and their habitats should they exist on the property.*

OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A)      STEW= Stewardship Program practices  
 STD= stand    Type= Forest type    AC= acre    MBF= thousand board feet    BA= basal area    VOL= volume

Owner(s) City of Gardner – Crystal Lake Reservoir      Town(s) Gardner

**Signature Page** Please check each box that applies.

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**CH. 61/61A Management Plan** I attest that I am familiar with and will be bound by all applicable Federal, State, and Local environmental laws and /or rules and regulations of the Department of Conservation and Recreation. I further understand that in the event that I convey all or any portion of this land during the period of classification, I am under obligation to notify the grantee(s) of all obligations of this plan which become his/hers to perform and will notify the Department of Conservation and Recreation of said change of ownership.

**Forest Stewardship Plan.** I pledge to abide by the management provisions of this Stewardship Management Plan for a period of at least ten years, following approval. I understand that in the event that I convey all or a portion of the land described in this plan during the period of the plan, I will notify the Department of Conservation and Recreation of this change in ownership.

Signed under the pains of perjury:

Owner(s) \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_ Date \_\_\_\_\_

---

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I attest that I have prepared this plan in good faith to reflect the landowner's interest.

Plan Preparer \_\_\_\_\_ Date \_\_\_\_\_

I attest that the plan satisfactorily meets the requirements of CH61/61A and/or the Forest Stewardship Program.

Approved, Service Forester \_\_\_\_\_ Date \_\_\_\_\_

Approved, Regional Supervisor \_\_\_\_\_ Date \_\_\_\_\_

In the event of a change of ownership of all or part of the property, the new owner must file an amended Ch. 61/61A plan within 90 days from the transfer of title to insure continuation of Ch. 61/61A classification.

Owner(s) City of Gardner – Crystal Lake Reservoir Town(s) Gardner

# COMPARTMENT & ASSESSORS MAP

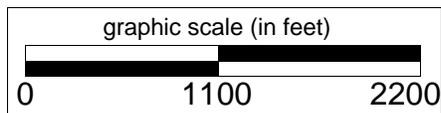
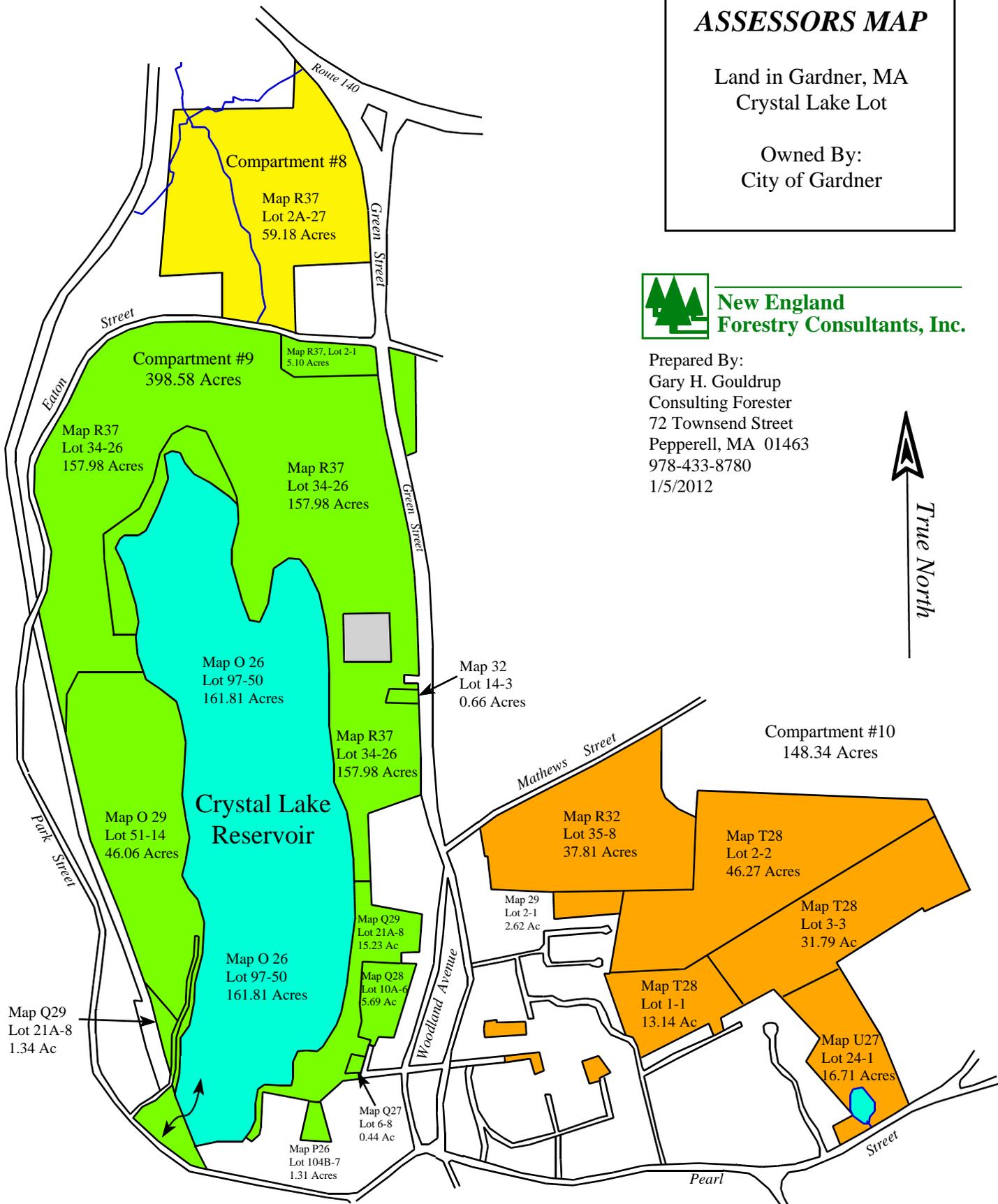
Land in Gardner, MA  
Crystal Lake Lot

Owned By:  
City of Gardner



**New England  
Forestry Consultants, Inc.**

Prepared By:  
Gary H. Gouldrup  
Consulting Forester  
72 Townsend Street  
Pepperell, MA 01463  
978-433-8780  
1/5/2012



**BOUNDARY & STAND TYPE MAP**

Land in Gardner, MA  
Crystal Lake Reservoir Lot  
Compartment #8

Owned By:  
City of Gardner

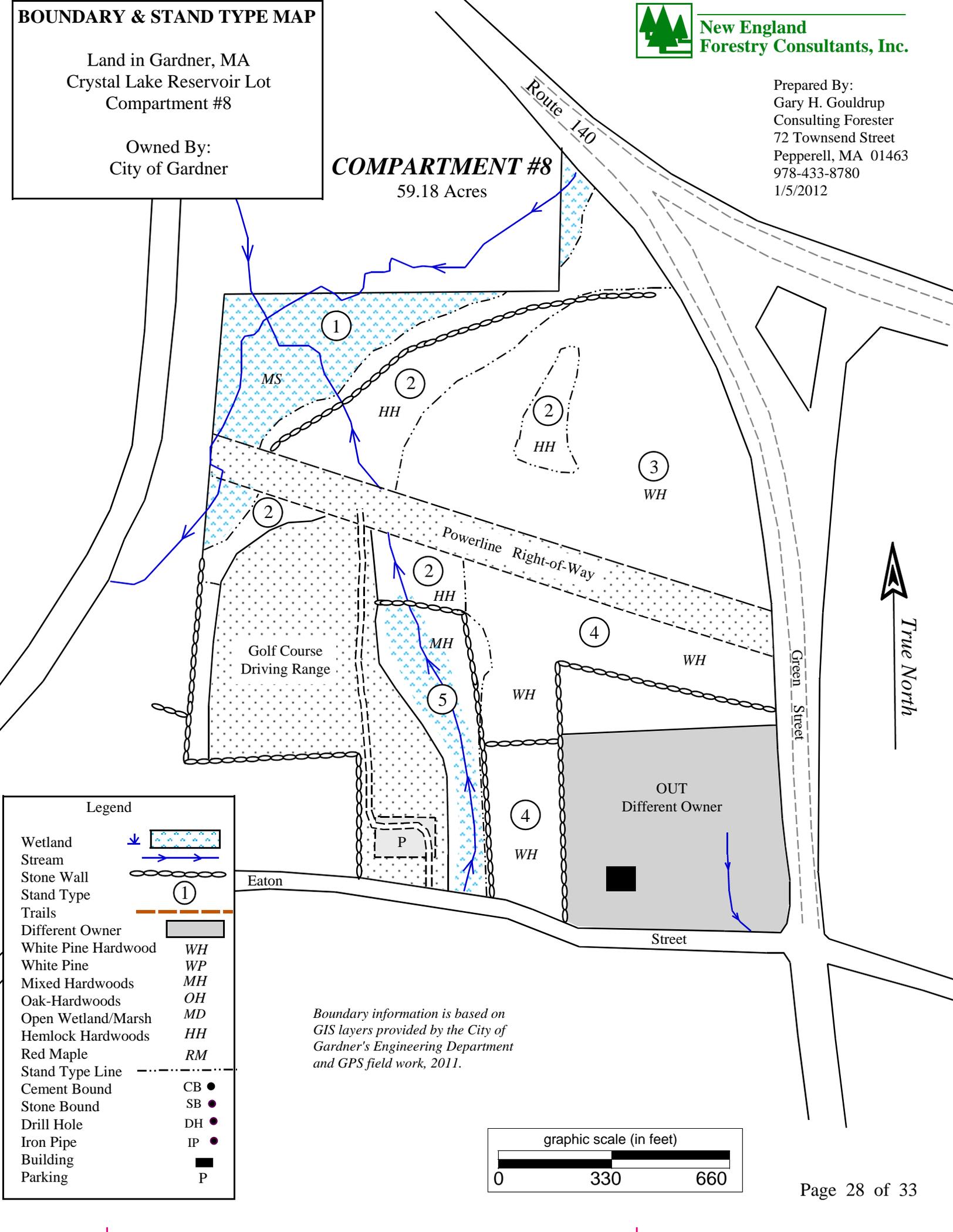


**New England  
Forestry Consultants, Inc.**

Prepared By:  
Gary H. Gouldrup  
Consulting Forester  
72 Townsend Street  
Pepperell, MA 01463  
978-433-8780  
1/5/2012

**COMPARTMENT #8**

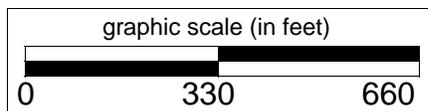
59.18 Acres



**Legend**

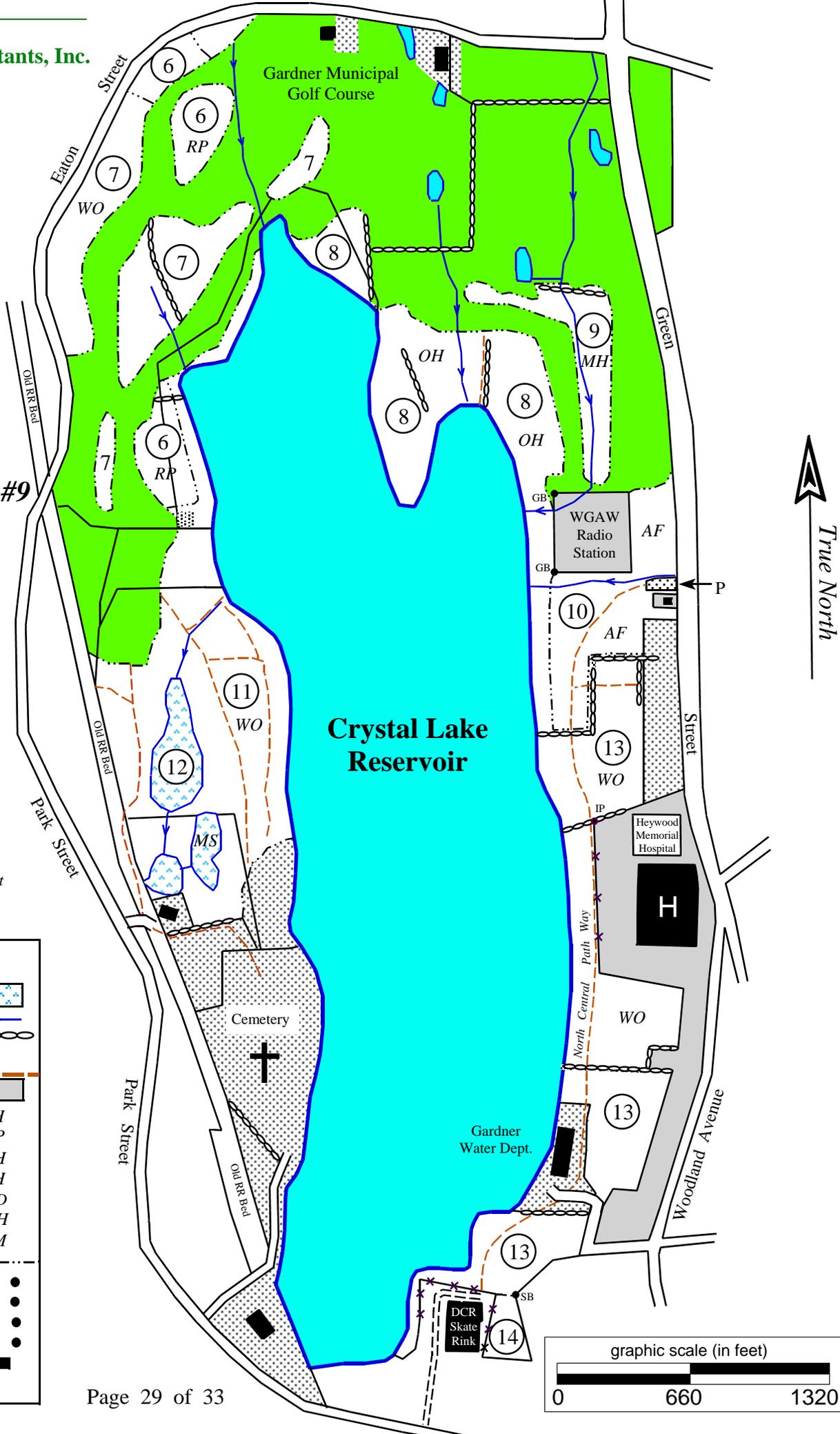
- Wetland
- Stream
- Stone Wall
- Stand Type 1
- Trails
- Different Owner
- White Pine Hardwood WH
- White Pine WP
- Mixed Hardwoods MH
- Oak-Hardwoods OH
- Open Wetland/Marsh MD
- Hemlock Hardwoods HH
- Red Maple RM
- Stand Type Line
- Cement Bound CB ●
- Stone Bound SB ●
- Drill Hole DH ●
- Iron Pipe IP ●
- Building
- Parking P

*Boundary information is based on GIS layers provided by the City of Gardner's Engineering Department and GPS field work, 2011.*





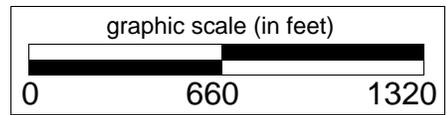
Prepared By:  
Gary H. Gouldrup  
Consulting Forester  
72 Townsend Street  
Pepperell, MA 01463  
978-433-8780  
1/5/2012



**COMPARTMENT #9**  
398.58 Acres

Boundary information is based on GIS layers provided by the City of Gardner's Engineering Department and GPS field work, 2011.

Legend	
Wetland	
Stream	
Stone Wall	
Stand Type	
Trails	
Different Owner	
White Pine Hardwood	WH
White Pine	WP
Mixed Hardwoods	MH
Oak-Hardwoods	OH
Open Wetland/Marsh	MD
Hemlock Hardwoods	HH
Red Maple	RM
Stand Type Line	
Cement Bound	CB ●
Stone Bound	SB ●
Drill Hole	DH ●
Iron Pipe	IP ●
Building	
Parking	P





**New England  
Forestry Consultants, Inc.**

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1/5/2012

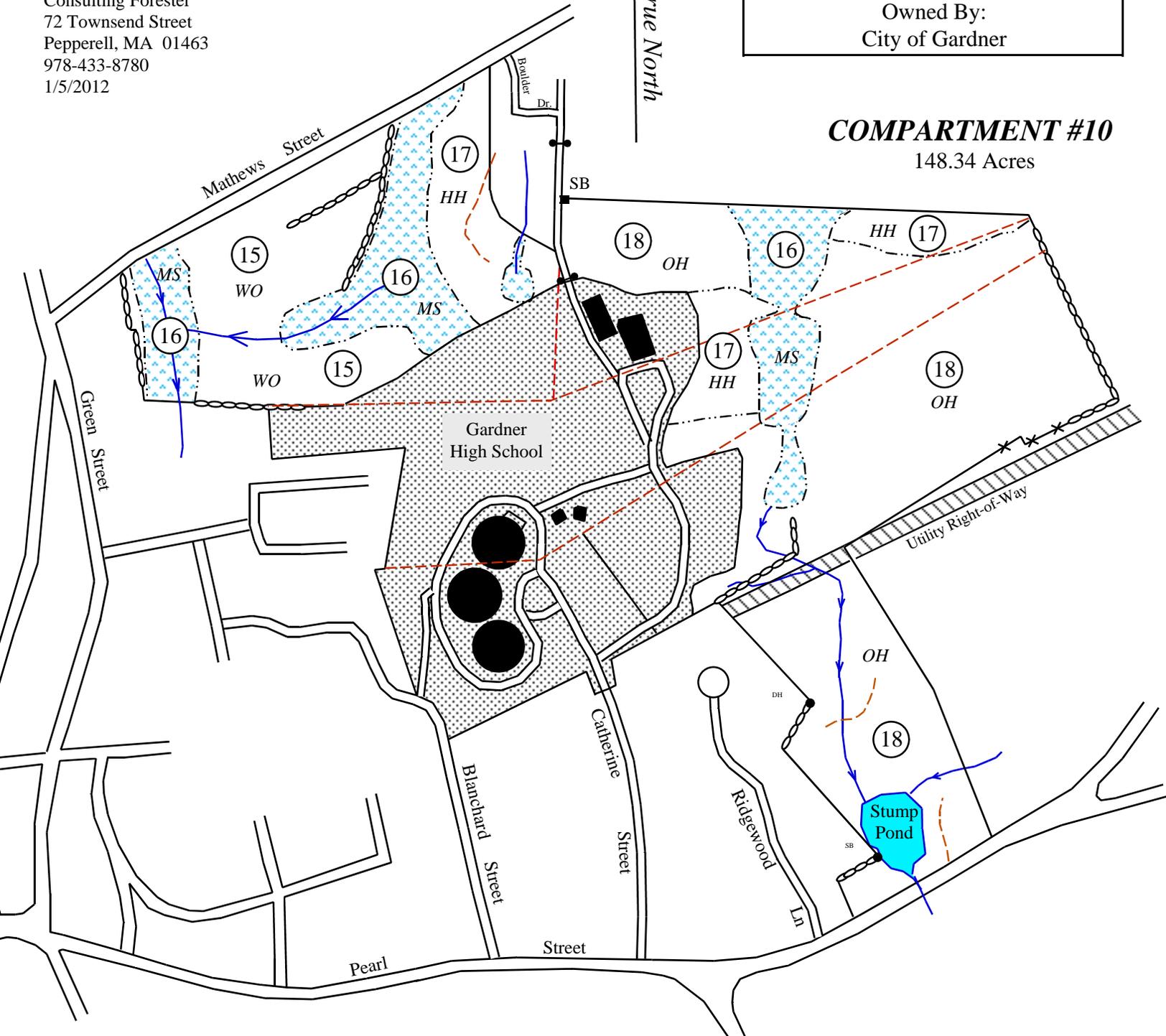
**BOUNDARY & STAND TYPE MAP**

Land in Gardner, MA  
Crystal Lake Reservoir Lot  
Compartment #10

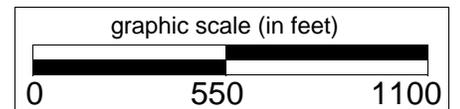
Owned By:  
City of Gardner

**COMPARTMENT #10**

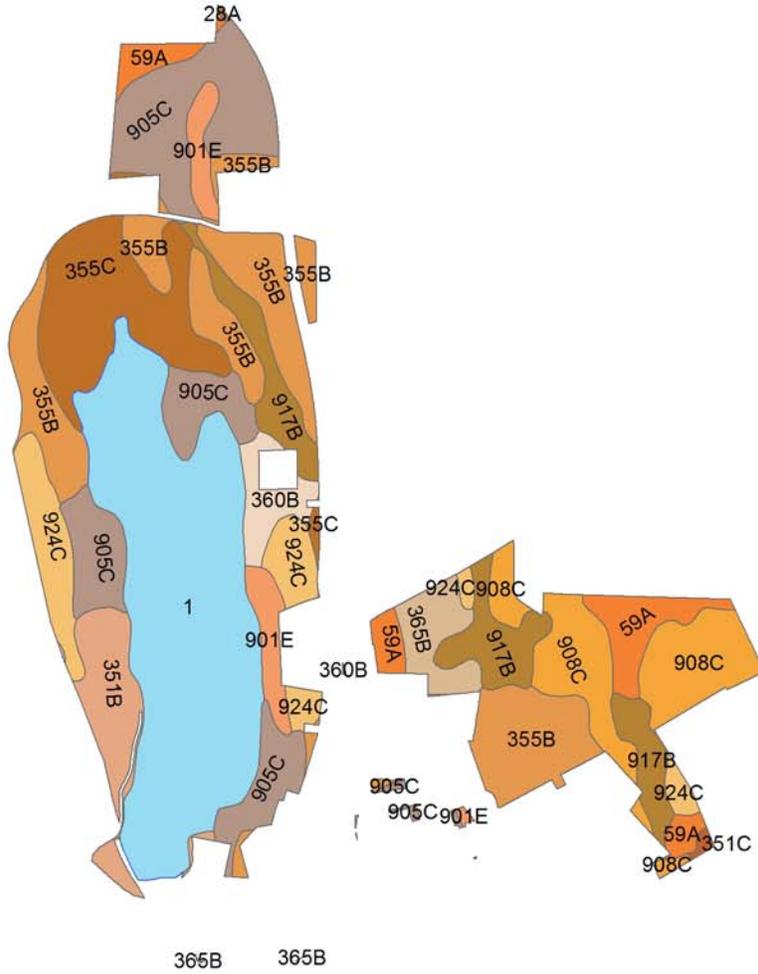
148.34 Acres



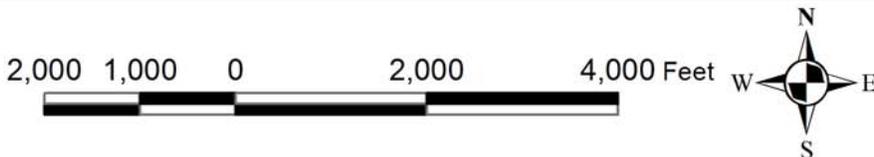
Wetland		Open Wetland/Marsh	MD
Stream		Hemlock Hardwoods	HH
Stone Wall		Red Maple	RM
Stand Type		Stand Type Line	-----
Trails		Cement Bound	CB ●
Different Owner		Stone Bound	SB ●
White Pine Hardwood	WH	Drill Hole	DH ●
White Pine	WP	Iron Pipe	IP ●
Mixed Hardwoods	MH	Building	■
Oak-Hardwoods	OH	Parking	P



City of Gardner  
Crystal Lake Lots  
Gardner, MA  
Soils Map



307B Soils Symbol



Prepared by:  
New England Forestry Consultants, Inc  
Sherman R. Small, Consulting Forester  
Maine License # LF655  
New Hampshire License # 409  
April 28, 2011

Sketch map for management and planning purposes only, NOT A LEGAL SURVEY  
Data obtained from MASS GIS, & New England Forestry Consultants, Inc.

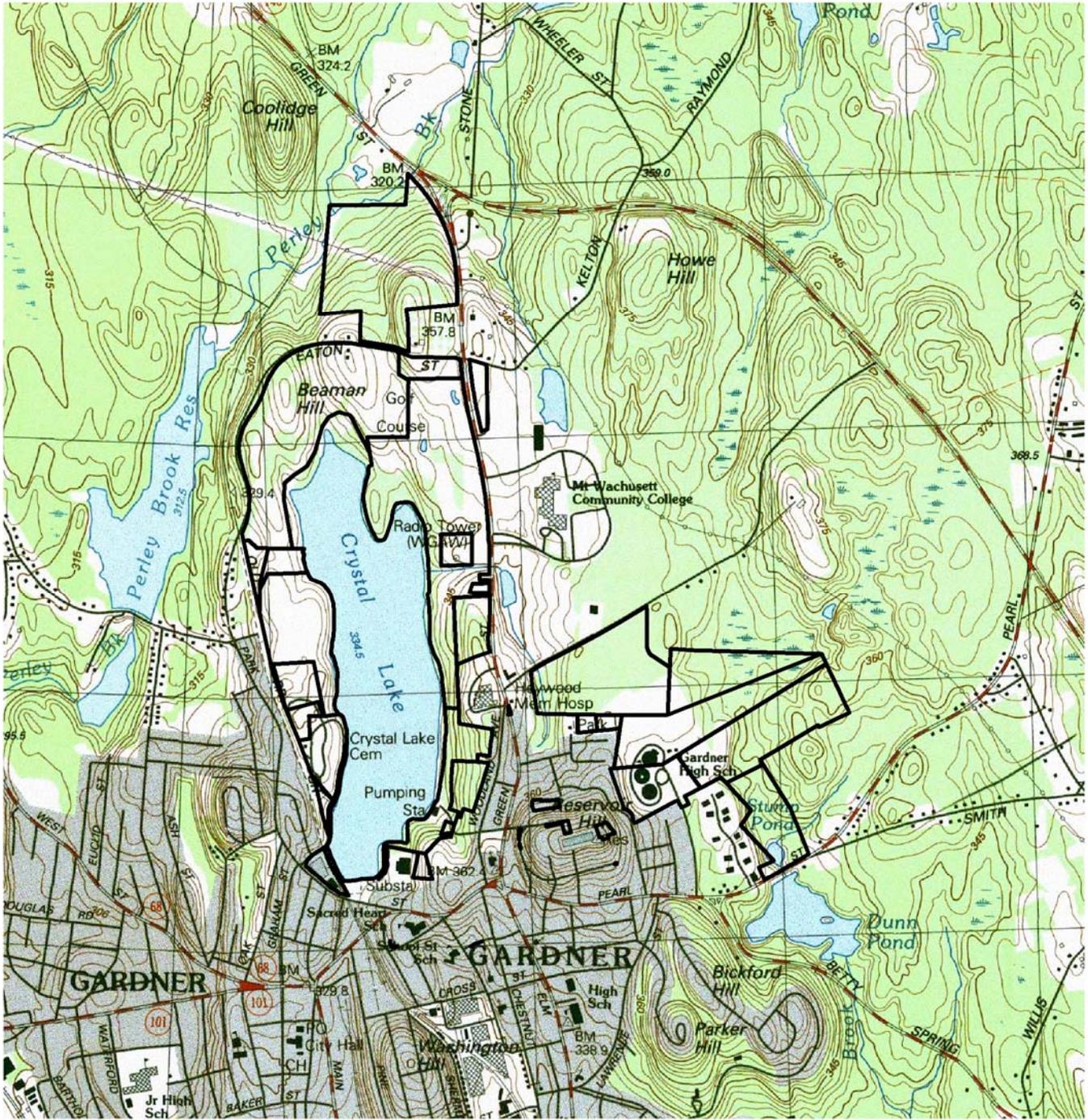
City of Gardner  
Crystal Lake Lots  
Gardner, MA  
2005 Aerial Photo



Prepared by:  
New England Forestry Consultants, Inc  
Sherman R. Small, Consulting Forester  
Maine License # LF655  
New Hampshire License # 409  
April 28, 2011

Sketch map for management and planning purposes only, NOT A LEGAL SURVEY  
Data obtained from MASS GIS, & New England Forestry Consultants, Inc.

City of Gardner  
Crystal Lake Lots  
Gardner, MA  
Gardner & Templeton Quadrangles



Prepared by:  
New England Forestry Consultants, Inc  
Sherman R. Small, Consulting Forester  
Maine License # LF655  
New Hampshire License # 409  
January 20, 2012

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