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1.0 INTRODUCTION

1.1 ACKNOWLEDGEMENTS

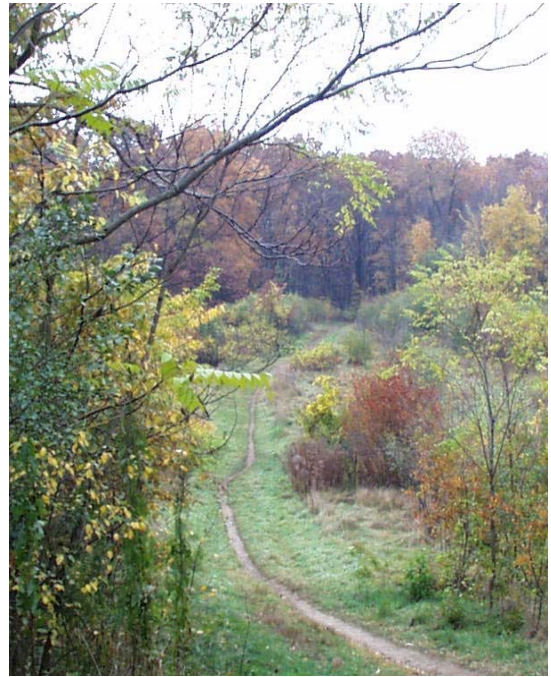
This Ecological Management Plan was developed by the consultant team under the guidance of the Town of Belmont – Office of Community Development. The McLean Land Management Committee (LMC), an appointed Town committee, also played a key role in providing information and constructive advice throughout the planning process. Special acknowledgement is owed to Tim Higgins, Senior Planner for the Town of Belmont, and to the members of the LMC, whose contributions have substantially shaped and strengthened this Plan. Members of the LMC are as follows:

Town of Belmont Appointees

Ellen O'Brien Cushman (Chairman) – Cemetery Commission
Richard Pichette – Historical District Commission
Ruth Foster – Conservation Commission
Lauren Meier – Selectmen Appointee

McLean Hospital Appointees

Michelle Gougeon – COO, McLean Hospital
Andy Healy – McLean Hospital
Frank Keefe – Keefe Associates, Inc.
Stephen Kidder – Hemenway & Barnes, LLP



View towards proposed cemetery site.

Now that the Ecological Management Plan has been completed, the LMC will continue to play an important role in assisting the Town with its implementation and stewardship of the McLean open space land. This plan should be reviewed on a regular basis and updated to reflect current conditions.

1.2 PROJECT PURPOSE

The McLean Hospital campus comprises 238 acres in Belmont, Massachusetts (Figure 1, Locus Map). As reflected in the McLean Land Use Memorandum of Agreement, the Town has approved a mixed-use development plan that will convert sections of the property to general residential housing, senior housing, a research and development park, and a Town cemetery (Figure 2, McLean Development Zones). As part of this plan, 105.7 acres of undeveloped land around the core hospital campus will become protected as publicly accessible open space.

The McLean open space is of great ecological and recreational value, providing a large, diverse and contiguous natural refuge only several miles from downtown Boston. The McLean property also serves as the eastern anchor of a regionally significant greenway that connects with other open spaces in Belmont, Waltham and Lexington (Figure 3, Regional Greenway Map). This Ecological Management Plan has been developed to assist the Town of Belmont (hereafter referred to as the Town) in managing the natural communities on the McLean property following its transfer from private to public stewardship, while understanding its use by the public.

1.2 METHODOLOGY

As requested by the Town, this report provides a synthesis of a number of recent studies that evaluated ecological conditions on the site. Many of the observations and recommendations from these studies are included in this report. As needed, additional site investigations were conducted to support previous studies and provide additional analysis and open space management recommendations.

INSERT FIGURE 1

INSERT FIGURE 2

INSERT FIGURE 3

The primary existing reports reviewed by BSC included the following:

- Documentation and Photographs of May 1998 Site Walk – Reference for Reports 2 and 3. Pressley Associates, Inc. May 1998.
- Results of May 1998 McLean Hospital Field Assessment. Woodlot Alternatives, Inc. May 1998.
- Assessment of Development Impacts to Natural Communities, McLean Hospital. LEC Environmental Consultants, Inc. May 1998.
- Context Statement and Archeological Site Expectations, McLean Hospital. The Public Archaeology Laboratory, Inc. July 1998.
- Stormwater Management Report for Proposed Development of McLean Hospital. Pressley Associates, Inc. July 1998.
- Ecological Assessment of Undeveloped Areas on the McLean Hospital Property. Woodlot Alternatives, Inc. August 1997.
- Wildlife Habitat Evaluation, McLean Hospital, Belmont, Massachusetts. LEC Environmental Consultants, Inc. June 1997.
- Bird Species Diversity, Abundance and Habitat Useage on the McLean Hospital Property, Belmont, Massachusetts. Jason M. Cortell & Associates, Inc. July 1998.
- The McLean Handbook. The Belmont Research Committee. February 1999.
- McLean Hospital Historic Issues Report. Candace Jenkins. June 1997.
- Known or Expected Wildlife Species on the McLean Hospital Site. Jason M. Cortell & Associates, Inc. July 1997.
- Open Space Analysis for McLean Hospital Land. Belmont Conservation Commission. Not dated.

In addition the reports listed above, BSC also reviewed a variety of reports, memorandums, maps and other documents relevant to the proposed development of the McLean property. Sources of this information included handout packages from public meetings of the McLean Hospital Land Use Task Force, the McLean Open Space Alliance website (www.mosa.org) and the McLean Documentation section of the Town of Belmont website (www.town.belmont.ma.us/mclean). Existing maps, MassGIS datalayers, and other available information regarding protected open space areas near or adjacent to McLean Hospital were also reviewed.

Given the extensive information available in the reports listed above, and as directed by the project scope of work, additional field data collection by BSC staff focused primarily on qualitative site assessments and refinement of existing information. BSC conducted a series of site visits between June and December 2000, to collect the following types of information:

1. ***Confirm/refine natural community boundaries:*** Using the existing conditions plan of the McLean Hospital property, BSC field-confirmed and refined the natural community-type (CT) boundaries. The CT boundaries identified in the 1997 Woodlot Alternatives report were used to facilitate location of general boundaries, which were confirmed and marked on the existing conditions plan. The CT boundaries were confirmed by evaluating the types of vegetative cover and dominant species within each CT and locating areas of transition between natural communities. Dominant species were recorded in a field data book, along with information on vegetation maturity and size, the presence of invasive species, and general qualitative notes on habitat values. Location of the CT boundaries were approximated on the existing conditions plan by using fixed points on the plan (i.e., buildings, trails and tree line) as a reference.

2. **Confirm/refine the presence and extent of invasive/non-native vegetation:** BSC staff visually assessed the presence, extent and relative dominance of invasive/non-native vegetation within each of the McLean natural community types. Qualitative information regarding invasive/non-native species was recorded in a field book. The location of infestations that are relevant to specific management recommendations were noted on the existing conditions map.
3. **Assess ecological management alternatives within each natural community type:** BSC assessed each CT with regards to ecological management alternatives. Each CT was assessed in terms of immediate needs, long-term management options, potential monitoring needs, invasive species control, and opportunities for wildlife habitat enhancement. General qualitative information was recorded in a field book. Locations relevant to specific management recommendations were noted on the existing conditions map.
4. **Assess condition of trails and public access points:** Each existing trail within the McLean property was evaluated for (1) general physical condition and (2) appropriateness for passive recreational use in conformance with the existing conservation restrictions on the site. Existing trailheads and public access points were also evaluated, as well as areas for potential improvements to public access to the site. General qualitative information was recorded in a field book. Locations relevant to specific management recommendations were noted on the existing conditions map.
5. **Assess visual quality issues:** Potential visual quality issues related to the McLean open space and the proposed development zones were assessed and recorded in a field book.

The site visits described above were conducted by the following BSC staff:

Name	Title	Date of Site Visit
Jamie Durand	Group Manager, Senior Wetland/Soil/Wildlife Scientist	June 20, 2000
Normand Hayes	Senior Wetland Scientist (Certified Arborist)	June 20, 2000
Robert Hartzel	Project Manager/ Senior Water Resource Scientist	October 29, 2000 October 30, 2000 November 6, 2000 December 4, 2000

Following field data collection, BSC generated the maps for this report on Autocad (version 14), using information from the existing conditions plan (provided by the Town) as a base. The photographs of site conditions found throughout this report were taken with a digital camera during the site visit conducted on October 30, 2000.

After assessing existing data and data from the site visits described above, BSC developed the property management recommendations that can be found in Section 3.0 of this report.

2.0 PROPERTY DESCRIPTION

2.1 OVERVIEW

The McLean Hospital property is located in Belmont, MA and covers approximately 238 acres (see Figure 1, Site Locus Map). The property is bounded by Concord Avenue to the north, Trapelo Road and Pleasant Street to the south, Mill Street to the west, and private property to the east. Additionally, a 4.5 acre parcel which is the site of the McLean Hospital farmhouse and barn is located on the west side of Mill Street. The hospital property includes 105.7 undeveloped acres that will become protected public open space as part of the redevelopment plan for the property. The hospital property also includes 18.2 acres of land that will remain as privately owned open space. The private open space areas abut the public open space and are protected from future development by conservation restrictions on the parcels. The McLean Hospital open space provides a variety of habitat and landscape types, including mature hardwood forest stands, open fields and wetlands. This area is also a vital part of a regional greenway of contiguous open space in Belmont, Waltham and Lexington (see Figure 3, Regional Greenway Map).

2.2 SURROUNDING LAND USES

McLean Hospital is surrounded by a variety of land uses. A significant portion of the surrounding region is comprised of established residential and business development with predominantly mature landscaping. An elementary school campus, the Belmont Day School, is also adjacent to the site. However, as mentioned above, the McLean public open space is unique in that it is adjacent to a number of protected open space areas that comprise a regionally significant greenway. These properties include:

- **McLean Hospital-Private Open Space Areas** include (1) 11.2 acres of predominantly forested land adjacent to Mill Street at the eastern edge of the property, (2) 5.5 acres of open lawn known as Upham Bowl, west of the core hospital campus, and (3) the 1.5-acre Belmont Day School soccer field.
- **Beaver Brook Reservation** (MDC) is located across Mill Street to the west and Trapelo Road to the south from the southwestern section of the McLean property. This 59-acre Reservation borders a section of Beaver Brook along the Belmont/Waltham town line, with areas of open fields, woods, ponds and wetlands. The section of the Reservation located south of Trapelo Road also features a ballfield, tennis courts, a wading pool and playground.
- **Habitat Wildlife Sanctuary** (Massachusetts Audubon Society) is north of the McLean property, across Concord Avenue. The 86-acre Sanctuary occupies the site of a former estate and includes gardens, open fields and woods.
- **Rock Meadow Conservation/Recreation Land** (Town of Belmont) is located across Mill Street from the northwestern portion of the property. This 70.2-acre property, which is managed by the Belmont Conservation Commission, includes open fields, woods, a playground, ballfield, and an area used for community gardens (Kendall Gardens).
- **Incinerator Site** (Town of Belmont) is a 26-acre parcel connecting the Rock Meadow Conservation/recreation Land with the Metropolitan State Hospital site. The incinerator at this site is no longer active, but continues to serve as a solid waste transfer station.

- **Other open spaces** within the regional greenway that do not directly abut the McLean property include the Metropolitan State Hospital land which is now managed as a MDC reservation, and the City of Waltham conservation land surrounding the Fernald School site. The Town of Belmont also owns a 6-acre parcel located adjacent to the eastern edge of the McLean property, north of Pleasant Street.

2.3 NATURAL RESOURCES

2.3.1 Natural Community Types

The undeveloped portion of the McLean Hospital property is comprised of a variety of forest, wetland and open field communities. As outlined in Section 1.2 (Methodology), these natural communities have been studied, mapped and documented by a variety of consultants and other organizations. Inventories of the vegetation and wildlife communities of the McLean property were conducted by Jason M. Cortell and Associates, Inc. during 1997 and 1998. These inventories represent the most comprehensive listing of species available for the property and are included as appendices to this report (Appendix 1).

In developing this Ecological Management Plan, BSC used the natural community type classifications and boundaries from the 1997 study by Woodlot Alternatives, Inc. (WA) as a base, while also incorporating information from the other studies and additional site investigations. As described in the WA study, the undeveloped portion of McLean Hospital includes “a variety of natural communities in different levels of succession and environmental quality”. These undeveloped areas were divided by WA into six natural community types (Figure 4, Natural Community Types Map), as follows:

Community Type (CT)	Description
CT-A	Mature Hardwood Forest
CT-B	Pitch Pine Woodland
CT-C	Fields / Pine Allee
CT-D	Wetlands / Water Resources
CT-E	Mixed Hardwood /Softwood Forest
CT-F	Successional Woods with Invasive Species

A summary description of the natural community types found on the McLean property is given in the following sections, and a discussion of land management issues and recommendations provided in Section 3.1 (Natural Community Management).

INSERT FIGURE 4



Mature hardwood trees along cart path.



Invasive Japanese knotweed at edge of cart path.



Steeply sloped area with ledge outcrop.

2.3.1.1 Community Type A: Mature Hardwood Forest

The southeastern section of the property is comprised of a mature hardwood forest (Figure 5). This community type has the highest ecological value and habitat diversity on the site, due to its large-diameter canopy trees, diverse and well developed subcanopy layers, abundant snags, cavity trees, forested wetlands and intermittent streams.

This area, which is bounded by Pleasant Street to the south, can be predominantly characterized as an oak/hickory forest with mature trees averaging 70-90 years in age. Many specimen red oaks with a basal diameter of 18-24 inches and an average height of 70-75 feet can be found throughout this area. Other overstory tree species found in this area include shagbark hickory, pignut hickory, white oak, black oak, red maple, sugar maple, chestnut, American beech, hophornbeam and an occasional white pine. The diverse shrub layer includes such species as maple-leaved viburnum, mountain ash, dogwoods, wild raisin and highbush blueberry. The herb layer includes Jack-in-the-pulpit, striped wintergreen, striped pipsissewa and Canada mayflower.

The topography in this area ranges from gradually to steeply sloping to the southeast, with a number of ledge outcrops found in the steeply sloped areas. The slope wetland in the southeastern corner of the site, just East of Codman House, is partially fed by a groundwater spring. An intermittent stream originates at this location and flows towards Pleasant Street. A second intermittent stream flows towards Pleasant Street from the area just south of Higginson House.

Although this section of the property is generally of high ecological integrity, the presence of two invasive species should be noted. Both Japanese knotweed (*Polygonum cuspidatum*) and tree-of-heaven (*Ailanthus altissima*) were found growing in several areas that indicated signs of past disturbance. Recommendations on the control of these species can be found in Section 3.1 (Natural Community Management) of this report.

This natural community appears to be close to its successional climax, with the proportion of shade trees (e.g. beech and sugar maple) gradually increasing overtime. As such, this forest type should be stable and continue to provide high quality habitat values.

INSERT FIGURE 5



Grassy slope near edge of pitch pine stand.

2.3.1.2 Community Type B: Pitch Pine Woodland

The northern corner of the McLean property provides several distinct types of vegetative cover and is the only open space link between the Rock Meadow conservation land and the Massachusetts Audubon Habitat Wildlife Sanctuary. The core of this area is a pitch pine woodland (Figure 6), with a relatively open understory dominated by little bluestem grass and other grasses.

The canopy layer pitch pines are estimated to range in height from approximately 38 to 50 feet. The sandy soils found in this area are favorable to the growth of pitch pines. Both pitch pine and little bluestem are species dependent on periodic fires for reproduction. Pitch pines seeds are held in cones that are tightly sealed by resin. These seeds are not released until high temperatures from fire melt the resin and allow the cone to open.

Pitch pine communities are temporary from a successional point of view due to the species' intolerance to shade. Red oaks and emerging hickory saplings are found interspersed among the pitch pines, which is common to pitch pine communities. Without the use of periodic controlled burning, these and other shade-tolerant species will increase in dominance and gradually take over the area.

INSERT FIGURE 6

2.3.1.3 Community Type C: Fields and the Pine Allee



Specimen hickory on “Lone Tree Hill”



The Pine Allee

Community Type C (Figure 7) is primarily comprised of two open fields, known locally as the “Great Field” (See Figure 4, Area #10) and the “Heart-shaped Field” (See Fig. 3, Area # 11). These fields are located at the northern end of the property, south of Concord Avenue. Separating the Great Field from Concord Avenue is a narrow stand of mature white pines that form a popular walking trail known as the “Pine Allee” (Fig. 3, Area #1). Although the Great Field area will be maintained as public open space, most of the Heart-shaped Field area will be developed as the new Town cemetery .

This community provides significant open field habitat that is relatively uncommon in the region. The fields include a variety of herbaceous species, including fescue grass, Queen Anne’s lace, sweet woodruff, cow vetch and common plantain. These fields are important to the overall habitat diversity of the McLean Hospital property, providing habitat for a variety of small mammals and birds that prefer open country or old field/shrub thicket habitat (i.e., northern flicker, indigo bunting, American goldfinch and brown thrasher), as well as edge habitat for larger mammals and predatory birds (i.e., red-tailed hawks).

In addition to habitat values, these fields are valued for their walking trails and the open vistas they afford. Several specimen trees can be found in this area, including a mature hickory that sits at the crest of a local landmark known as Lone Tree Hill.

Both of the fields have been historically maintained by mowing and grazing. However, mowing has not taken place since the mid-1990’s and some areas have become overgrown with shrubs and young trees. The perimeter of the Heart-shaped field has become particularly overgrown and is beginning to lose its open field structure, as is the southern perimeter of the Great Field. These successional areas have been heavily colonized by invasive species such as buckthorn, Oriental bittersweet and poison



ivy.

View northwest across the Great Field toward the Pine Allee.

INSERT FIGURE 7



Vernal pool south of Concord Avenue.

across the property. The second wetland surrounds a certified vernal pool located between the eastern extent of



Forested wetland dominated by red maple.



Intermittent stream channel in red maple swamp

2.3.1.4 Community Type D: Wetlands / Water Resources

Community Type D (Figure 8) includes two significant wetlands located within the northern section of the McLean property, four intermittent streams, and several isolated wetland pockets. Collectively, these wetlands contribute significantly to the ecological diversity and functions of the McLean property. Wetlands provide essential habitat for birds, mammals and amphibians, while providing important functions such as water quality protection and flood storage.

The largest wetland is a red maple swamp (see Figure 4, Area #12) to the north of the water tower. This wetland, which includes a certified vernal pool, drains to an intermittent stream that flows generally east to west across the property. As described in Section 2.3.1.1, two intermittent streams and associated bordering vegetated wetlands are located within CT-A (Mature Hardwood Forest). A small intermittent stream within CT-E (Mixed Hardwood/Softwood Forest) is located at the southwestern corner of the property. Several small, isolated wetlands are located just west of the Great Field.

The red maple swamp area has an overstory that includes species such as yellow birch, gray birch, swamp white oak, red oak, and American elm. The shrub layer is dominated by sweet pepperbush, highbush blueberry, northern arrowwood and swamp azalea. This area has significant signs of periodic inundation and pockets of standing water. The intermittent stream that flows from this wetland is tributary to Beaver Brook, which is within the Charles River watershed. The transitional wetland and buffer zone area surrounding this wetland are dominated by a mix of red maple and red oak.

The vernal pool area (see Figure 4, Area #16) is an apparent isolated wetland with a finger of wetland vegetation extending to the northwest. The perimeter of this area has an overstory of Norway maple, green ash, American elm and red maple. The understory is dominated by invasive buckthorn and poison ivy.

INSERT FIGURE 8



Mixed hardwood/softwood forest to east of water tower.



Mature white pine stand to south of water tower.

2.3.1.5 Community Type E: Mixed Hardwood/Softwood Forest

Community Type E (Figure 9) is comprised of a mixed hardwood/softwood upland forest, with relatively few large diameter canopy trees. This community type is found in several areas on the McLean campus; the area surrounding the water tank to the east of the Bowditch and Oaks buildings, the southwest section of the property, and a relatively small section at the northwest corner of the property. This type of community typically develops from secondary-growth white pine on old fields where hardwood seedlings and saplings form in the understory and ultimately become the dominant stand due to superior shade tolerance.

The dominant canopy tree species in this community include red oak, white pine and Norway maple, with lesser amounts of hickory, red maple and sugar maple. Small stands of mature white pines dominate in some areas. As described in the WA report, the understory is moderately stratified and diverse, yet provides less diversity and habitat value than CT-A (Mature Hardwood Forest) due to lesser maturity, drier soils, fewer large diameter trees, and fewer snags (standing dead trees from which the leaves and most of the branches have fallen). Shrub species in this community include sugar maple, gray birch, pignut hickory and black cherry. The herb layer includes Canada mayflower, false Solomon seal, hayscented fern and poison ivy.

CT-E, like the mature hardwood forest is relatively free of nuisance invasive species, with the exception of Norway Maple. Selective thinning of Norway maple is a recommended land management tool in CT-E, to encourage a native climax forest community type, promote growth of larger diameter trees and encourage development of the understory.

INSERT FIGURE 9



Abandoned orchard area dominated by invasive buckthorn.



Invasive bittersweet growing near edge of cemetery site.



2.3.1.6 Community Type F: Successional Woods with Invasive Species

CT-F (Figure 10) includes areas to the west, south and east of the Great Field which are comprised of successional forests, old fields and abandoned orchard areas that have become dominated by shrubs, young trees and invasive species. These successional areas are in varying stages of development, with some of the old field areas having become overgrown only since regular mowing ceased in the mid-1990's.

The ecological value and diversity of these areas have been degraded by non-native invasive species such as buckthorn, Oriental bittersweet, Japanese knotweed, tree-of-heaven, Norway maple and black locust. Native pioneer species such as poison ivy and staghorn sumac are also abundant. Dense growth of these species diminishes habitat values by reducing biodiversity and choking out the growth of beneficial native plants. Often, non-native species provide limited food source and habitat value when compared to the native species that they displace. Established stands of invasive plants also pose the threat of continued spread into adjacent areas. As described by the WA study, these degraded areas have the lowest ecological value in the undeveloped portion of the property. A discussion of the specific invasive species found in CT-F and management techniques used for their control is included in Section 3.1.3 (Invasive Species Control) of this report.

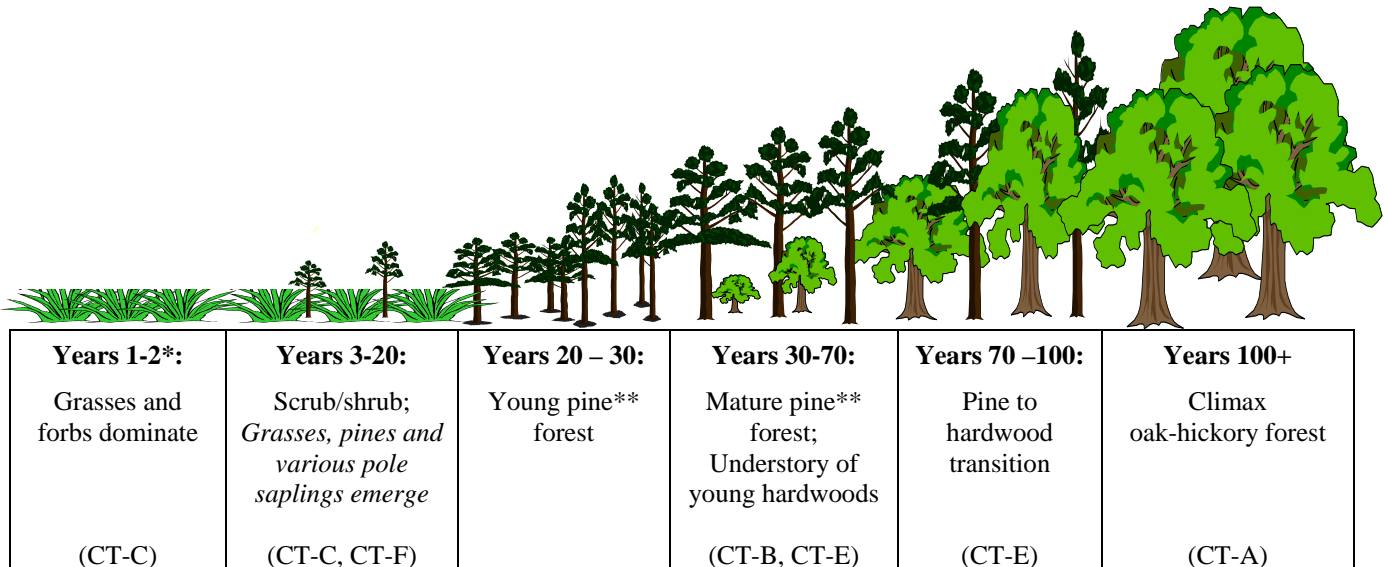
In the area to the west of the Great Field, just north of the North Cottage, a significant amount of construction debris has been dumped in scattered piles (see Figure 4, Area #3). The Memorandum of Agreement between McLean Hospital and the Town requires that the debris piles be removed and the area be restored. The debris piles are located within and adjacent to several small isolated wetlands. These wetlands are heavily dominated by the invasive purple loosestrife, with lesser amounts of other herbaceous species such as spike rush, Canada rush, soft rush, Foxtail sedge and sensitive fern.

INSERT FIGURE 10

2.3.2 Natural Community Succession

Succession is a natural pattern of ecosystem change that takes place over time. In terms of natural succession, much of the site can be described within the continuum of secondary old field succession, as depicted in Figure 11 below. Old field succession begins when plants recolonize land that was previously used for farming. Figure 11 depicts a generalized process of old field succession, which can often be altered by disturbances such as human land management practices and invasive species infestations.

Figure 11: Old Field Succession



* for unmowed, unmanaged fields

** will vary in wetlands (red maple, etc,) and managed/disturbed areas (varies)

The open fields of CT-C can be characterized at the beginning of the succession process. These areas have been maintained as open fields by regular mowing that was conducted through the mid-1990's, although perimeter areas and some interior sections have become dominated by a scrub/shrub/pole sapling community.

The majority of CT-F is comprised of relatively young successional areas that can be characterized as scrub/shrub and sapling communities that are dominated by invasive species. Several areas with more mature canopy vegetation are also included in CT-F due to a dominance of invasive species, such as the abandoned orchard just east of the pitch pine stand and the disturbed forest area to the south of the pitch pine stand.

Several stands of mature white pines located within CT-E, as well as the pitch pine stand within CT-B, can be characterized as areas of mature pine forest. In these areas, shade-tolerant hardwood species such as oaks and hickories will begin to emerge and will eventually dominate, gradually outcompeting the shade-intolerant pine saplings.

In the mixed hardwood/softwood forest areas of CT-E, the process of successional transition from pine to hardwood forest is well underway.

The mature hardwood forest at the eastern section of the property (CT-A) is typical of an oak-hickory climax community. This community should remain relatively stable until disturbances such as fires or wind storms create clearings that allow the process of succession to start again.

The wetland areas within CT-D do not directly follow the succession process depicted in Figure 11. Moist soils in wetland areas generally inhibit the establishment of pine saplings, allowing hydrophytic species such as red maple and spicebush to dominate. Barring any unforeseen changes in hydrology, these areas are expected to remain relatively stable.

2.3.3 Wildlife

Although the scope of this study did not include new detailed field inventories of flora and fauna, this information is available from studies previously conducted by Jason M. Cortell and Associates. A Cortell report titled Known or Expected Wildlife Species on the McLean Hospital Property (July 18, 1997) provides an inventory of birds, mammals, reptiles and amphibians that have been either directly observed on the property or are anticipated to be on the property due to the habitat types present. A separate Cortell report, titled Bird Species Diversity, Abundance and Habitat Useage on the McLean Hospital Property (July, 1998), provides a much more detailed inventory of bird populations from 16 bird count plots within the McLean property. The species inventory lists from these previous reports are included as Appendix 1 of this report.

2.3.4 Geology/ Soils

The soils and slopes of the McLean property have been previously mapped by Pressley Associates, Inc. and are included as Appendix 4 of this report. A brief summary of the soil types found on the property is as follows (adapted from Middlesex County, Massachusetts – Interim Soil Survey Report. USDA Soil Conservation Service, 1986.):

- **Narragansett-Hollis Rock Outcrop Complex:** This complex consists of a combination of the deep, well drained soils of the Narragansett series, the shallow, somewhat excessively drained soils of the Hollis series, and rock outcroppings. Hollis soils are found on bedrock controlled uplands as they formed in a thin mantle of glacial till or residuum from local bedrock. Narragansett soils were formed in silt mantled glacial till.
- **Narragansett Silt Loam:** This series consists of nearly level to steep, deep, well-drained soils on glacial till plains and ground moraine. They formed in silt mantled glacial till.
- **Montauk Fine Sandy Loam:** This series consists of very deep, well drained soils in uplands. These soils formed in a thin mantle of loamy material overlying sandy glacial till. Slopes range from 3 to 25 percent.
- **Charlton Fine Sandy Loam:** This series consists of very deep, well drained soils on uplands. These soils formed in friable (easily crumbled) glacial till. Slopes range from 3 to 25 percent.
- **Charlton-Hollis-Urban Land Complex:** This gently sloping to steep complex contains deep, well drained Charlton soils, excessively drained Hollis soils, and areas of urban land. Urban land consists of streets, parking lots, buildings, and other structures and makes up at least 25 percent of the landscape.
- **Hollis Rock Outcrop-Charlton Complex:** This complex consists of gently sloping to strongly sloping soils and areas of exposed bedrock on hills and ridges where the land is affected by the underlying bedrock. The shallow, somewhat excessively drained Hollis soil is on the tops of ridges or is near rock outcrops. The very deep, well drained Charlton soil is found in low pockets.
- **Newport Silt Loam:** This series consists of very deep, well drained soils on drumlins and moraines. Theses soils formed in friable glacial till overlying a firm substratum derived from conglomerate, shale, or slate. Slopes range from 3 to 25 percent.

- **Whitman Loam:** The Whitman series consists of very deep, very poorly drained soils on uplands. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 0 to 5 percent.
- **Woodbridge Fine Sandy Loam:** This series consists of very deep, moderately well drained on uplands. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 0 to 8 percent.
- **Pittstown Silt Loam:** The Pittstown series consists of very deep, moderately well drained soils on drumlins and moraines. These soils formed in friable glacial till that overlies a firm substratum and that is derived from conglomerate, shale and slate bedrock, Slopes range from 2 to 8 percent.
- **Sutton Fine Sandy Loam:** This series consists of nearly level to sloping, deep, moderately well drained soils in slight depressions of till plains and ground moraines. They formed in friable glacial till.



Trail heading north of the water tower.



2.4 TRAILS

A well-developed network of trails traverses the majority of the McLean open space (Figure 12). These trails afford access to all of the natural communities on the property and allow visitors to enjoy a wide range of scenery. The trails range from narrow footpaths to wide cart paths. In addition to their use for public recreation, many of the trails are designated as access roads for emergency vehicles. To allow emergency vehicle access, these trails must be maintained at a width of twelve (12) feet and height of twelve (12) feet. Although a few of the existing trails within CT-F (Successional Forest with Invasive Species) have become overgrown by encroaching vegetation, most are in good condition.

The main trail in the eastern section of the property is a cart path known as the “Coal Road” (Figure 4, Area # 13). This trail runs roughly parallel to Pleasant Street, then turns west, following the property line towards the water tower. Several trails branch off of this cart path, allowing access from the hospital core campus, the Belmont Day School sports field, and several private properties.

Just north of the water tower, several trails branch toward the northern section of the McLean property. Numerous trails crisscross the area to the north of the McLean core campus. These trails allow visitors to traverse forests, open fields and wetlands, enjoy open vistas from Lone Tree Hill, and walk beneath the towering pines of the Pine Allee.

The McLean trail network also allows hikers to connect with adjacent open space parcels at two locations. From a spur trail off the Pine Allee, hikers may cross Concord Avenue to continue on a trail that leads to the Massachusetts Audubon Habitat Wildlife Sanctuary (Figure 4, Area #17). In the northwest corner of the property, a trail to the west of the pitch pine forest leads to Mill Street, where hikers may cross to enter the Rock Meadow Conservation Land via the McLean farmhouse/barn site parcel (Figure 4, Area #7). Due to busy traffic on both Concord Avenue and Mill Street, pedestrian safety is a concern at these crossing points.

The only significant open space area lacking established trails is the forested area adjacent to Mill Street at the southwestern section of the property. This area, which is zoned as private open space, provides a buffer between

Mill Street and the core campus buildings. Although this area is located across Mill Street from the MDC Beaver Brook Reservation, no trails connect these two parcels.

INSERT FIGURE 12



Gated fire access lane entrance and radio tower from Concord Avenue.



Coal Road gated access at Pleasant Street.

2.5 PROPERTY ACCESS

Access to the undeveloped McLean land is currently informal and limited. The trail network is accessible from a number of locations along the perimeter of the McLean core campus. Pedestrian access to the trails can also be attained from a limited number of locations along the roads that bound the property. Although McLean Hospital has allowed informal public use of the trails for years, no formally established trailheads or parking areas are available from outside of the core campus.

From Mill Street, across from the access road to the McLean farmhouse/barn site, a narrow trail provides access to the northwest corner of the McLean property and serves as a link between these two open space areas. The McLean farmhouse/barn site parcel serves as a link to the Rock Meadow Conservation Land.

From Concord Avenue, three areas allow access to the Pine Allee trail. However, two of these access points are gated. One of the gated access points is to a cart path that has been recently re-widened to allow emergency vehicle access. Parking is not allowed in front of this gate, so that emergency vehicles are not blocked from access. One of the Concord Avenue access points also serves as a trail connector to the Audubon Habitat Wildlife Sanctuary to the north of Concord Avenue (Figure 4, Area #17).

From Pleasant Street, the Coal Road cart path can be accessed from two points at the southeast corner of the property. A gated access is at the beginning of the cart path, with a turnoff area large enough to provide parking for several cars. A short path approximately 300 feet to the west leads from directly from Pleasant Street to the cart path.

In addition to the public access points listed above, trails also connect the McLean open space to a number of adjacent private properties. Most of these trails are to the northeast of the property, including trails connecting to the sports field at the Belmont Day School.



McLean Hospital site selected by Frederick Law Olmsted.



Stone walls along the Coal Road.

2.6 CULTURAL RESOURCES

The McLean property, including its buildings, landscape design and vistas, are of significant historic importance. The modern history of the McLean property began in 1872, when renowned landscape architect Frederick Law Olmsted was hired to select a new site for the McLean Asylum, then located in Charlestown. Acting on Olmsted's recommendation, 114 acres of the "Waverly Highlands" were purchased by the hospital in 1875 and construction began in 1892. Additional parcels which comprise the undeveloped portion of the McLean property were acquired in the following years. The McLean campus is currently in the process of nomination to the National Register of Historic Places.

McLean was the nation's first psychiatric hospital to build a "cottage plan" campus, designed to allow patients to live in a more homelike setting. The architecturally significant landscape design and buildings remain within the original core campus today. Remnants of the site's historical uses include the stone walls along sections of the "Coal Road" cart path used as a supply route to the hospital (Figure 4, Area 13). Evidence of past agricultural use can be found in the abandoned orchards, old fields, the stone barn foundation and other remnants of Highland Stock Farm (Figure 4, Areas #4 and #5). Preservation of these historic features should be an important component of the property management plan.

Historic and archeological resources on the McLean property are described in "*Context Statement and Archeological Site Expectations, McLean Hospital*" (Public Archeology Laboratory, Inc., 1998). The 1998 PAL study has been recently updated and filed with the Belmont Historic District Commission and Massachusetts Historical Commission, but is not a public document. The 1998 PAL study is included as Appendix 2 to this report and a summary of its general findings is as follows:

- The open space areas outside of the core hospital campus are relatively undisturbed, and include several areas considered sensitive for prehistoric occupation and Native American archeological deposits. Any disturbance from footpaths on the property is considered minimal.
- Areas identified as "very sensitive" for Native American archeological deposits include "the elevated terraces adjacent to the wetland area in the northeast quadrant of the property" and "high elevations adjacent to intermittent streams found on the property". A piece of steatite was found on the property, although the depositional history of the piece could not be determined. Steatite cooking vessels were used by Native Americans about 3,600 to 2,500 years ago, and have been found at similar prehistoric sites in the Boston area.

- The stone foundation of a barn owned by W.W. Chenery as part of the Highland Stock Farm is located just south of the radio tower off of Concord Avenue. Fieldstone walls, a small outbuilding and a gravel-filled cistern associated with the barn were also identified.

3.0 PROPERTY MANAGEMENT

3.1 NATURAL COMMUNITY MANAGEMENT

Recommendations for ecological management of the McLean natural communities have been organized according to the following three primary ecological management goals:

- **Goal #1: Maintain Habitat Diversity.** The McLean property currently includes open fields, wetlands, shrub-sapling communities, and forested areas of varying maturity. Long-term management of the property should promote maintenance of this diversity, allowing a mosaic of habitats to support diverse wildlife species.
- **Goal #2: Improve Wildlife Habitat.** Within the existing natural community types, management actions can be taken to both improve the quality and increase the quantity of wildlife habitat. Specific recommendations include activities that enhance wildlife food sources and cover/shelter.
- **Goal #3: Invasive Species Control.** Non-native/invasive species pose a threat to the biodiversity and habitat values of the McLean property, particularly in the old field and young successional forest areas. An overall strategy for the control of invasive species should include (1) specific steps to control existing infestations in selected areas, particularly in areas with new and/or small infestations and (2) long-term monitoring to track the spread of invasive species and quickly identify new infestations.

The three ecological management goals listed above are inherently interconnected. For example, steps taken to mitigate a non-native species infestation (Goal #3) may promote the growth of native species with superior value as wildlife food sources (Goal #2). Despite the natural overlap between these primary goals, they provide a practical framework within which specific management recommendations may be organized and prioritized.

Where applicable, cost estimates for management recommendations have been estimated according to industry standard pricing for the required labor and materials. Cost estimates were obtained from a variety of sources, including Building Construction Cost Data – 58th Annual Edition. (R.S. Means Company, Inc., 2000).

3.1.1 Goal #1: Maintain Habitat Diversity

- **Maintain Open Fields (Mowing):** The open field areas can be maintained by resuming the regular mowing that ceased in the mid-1990's. If no management action is taken in the open fields, they will gradually continue the process of succession into forest.

Mowing at the end of the growing season will safely avoid the nesting and fledging periods of ground-nesting birds. Biannual mowing should be sufficient to maintain the open fields and is recommended. Annual mowing would obviously increase the cost of maintaining the fields, although it would make the process somewhat easier and more effective by limiting the size and seed production that pioneering woody plants can attain between mowings.

Estimated Cost: \$2,640 - \$4,060 biannually (based on mowing 12-14 acres at \$220-\$280/acre)

Priority: High



Meadow vole
(*Microtus pennsylvanicus*)

Maintain Open Fields (Brush/Sapling Cutting): Prior to the regular maintenance mowing described above, a medium-duty brush cutter will be needed to cut pole saplings that have pioneered in the field areas since mowing was last conducted in the mid-1990's. With bi-annual mowing, use of the brush cutter should not be required on a regular basis.

The brush cutter should also be used to cut the dense buckthorn saplings that dominate the abandoned orchard area located northwest of the Great Field.

Black cherries (and other pole saplings) growing on the slope meadow south of the pitch pine community (Figure 4, Area #9) should be selectively thinned to help maintain the open meadow, while promoting the growth of individual trees.

Estimated Cost: \$1,800 - \$2,400 (based on cutting 6 acres of shrubs/saplings at \$300-\$400/acre)

Priority: High

- **Creation/Maintenance of Edge Effects:** While cutting pioneering saplings and mowing of the open fields is recommended, preserving various vegetative cover types within the fields will enhance wildlife habitat. Preserving natural breaks in the landscape such as clumped shrub communities enhances habitat juxtaposition, which will promote cover for small mammals and nesting sites for passerine songbirds. Passerine songbirds are generally small birds that are well adapted to perching, such as song sparrows, flycatchers, vireos, nut hatches, robins, black-capped chickadees, and many other species found on the McLean property. Preservation of mature specimen trees in the fields will provide perching sites for birds of prey (i.e., hawks).



Song Sparrow (*Melospiza melodia*)

It is also recommended that that a shrub/sapling community of varying width (between 10 to 30 feet) be preserved between the open field areas and forest stands. Where possible, the brush cutting recommended above should be carefully planned to maintain a limited sapling community and the transitional edge habitat it provides.

Estimated Cost: No cost if coordinated with brush cutting/mowing activities described above.

Priority: High

- **Pitch Pine Woodland - Natural Succession vs. Prescribed Burning:** The Pitch Pine Woodland is the most sensitive community on the McLean property, in terms of its successional stage. Without the use of prescribed burning, the periodic fires that typically maintain this type of community are unlikely to occur. However, prescribed burning may not be a desirable management technique due to the proximity of this area to residential properties. In the absence of periodic fire, the pitch pine woodland will gradually be dominated by red oaks, hickories and other shade tolerant species that are typical of the other forested portions of the property. Because of the uniqueness of the pitch pine community within the McLean open space, this successional process would decrease the habitat and species diversity on the property. However, the oak-hickory forest which is expected to develop will continue to provide forest habitat, while also providing valuable mast (nuts and seeds) for wildlife.

In the event that the Town wishes to consider prescribed burning to maintain the unique pitch pine community, expert guidance on prescribed burning protocols can be obtained through The Nature Conservancy's Fire Management & Research Program. The Nature Conservancy, which conducts regular prescribed burning at 322 sites, considers fire to be its most important land management tool to protect biodiversity and control invasive species. Guidance should also be obtained from local fire officials and

the Massachusetts Department of Environmental Management – Division of Forests and Parks. Prescribed burning would be optimally conducted every 3 to 5 years.

Public education and outreach should be an important element of any controlled burn program. Users of the property who are unaccustomed to prescribed burning may become alarmed to see burning taking place in what may be perceived as a healthy forest area. Special efforts should be made to provide coordination and outreach to abutting private property owners located just north of the pitch pine area.

Estimated Cost: - If natural succession is allowed, no cost.
- If prescribed burning is implemented, costs may be minimal if local fire department(s) agree to conduct the burn as a training exercise.

Priority: Medium (if maintenance of pitch pine community is desired)

3.1.2 Goal #2: Improve Wildlife Habitat

In its current condition, the McLean open space provides valuable and regionally significant wildlife habitat. This is due to the relatively large area of contiguous open space it offers so close to metropolitan Boston, its connection to other open spaces as part of a regional greenway, and the diversity of habitats it offers.

A variety of active wildlife management programs may be implemented on the property. However, the ability to carry out these programs depends upon the level of manpower, funding and technical expertise that is available. In most municipalities, due to lack of funding and manpower, conservation land is managed passively and allowed to mature naturally over time. Although this may be a reasonable and appropriate approach to wildlife habitat management on portions the McLean property, the following low-cost active management strategies should also be considered:



American Toad (*Bufo Americanus*)

- **Prune apple trees:** A number of apple trees are present at the perimeter of the open field areas, particularly in the area to the northwest of the Great Field (Figure 4, Area #4). If properly managed, fruit from these trees can provide food for a variety of wildlife species. At a minimum, these trees should be pruned and the encroaching buckthorn saplings and other vegetation around them should be regularly cut back to prevent competition that will reduce fruit production. Additionally, the Town could hire a local apple grower or arborist to assess the orchard trees and provide a list of specific recommendations to increase fruit production. Such recommendations may include bringing in honey bees during the spring to ensure that the trees are adequately pollinated. In addition to improving wildlife food sources, actions to restore the orchard trees are consistent with the goal of preserving elements of the historic agricultural use of the McLean property.

Estimated Cost: Vegetation clearing can be done in coordination with the brush cutting/mowing described under Goal #1. Additional labor costs associated with pruning are estimated to be \$600 per year for a professional arborist.

Priority: Medium

- **Selective forest thinning:** A number of other important food producing plant species already exist on the McLean property, including oaks, hickories, dogwoods, viburnums, highbush and lowbush blueberry, white pine, and raspberry. The growth of these species could be promoted in targeted areas throughout the property to increase the mast for wildlife. For example, selective thinning in forest areas could be

conducted to promote oak and hickories. Thinning efforts should target Norway maple and other trees with lower wildlife food values. Another option is to target control of Glossy buckthorn (and other invasive species in the wetland areas) around existing highbush blueberry shrubs or other native species of high food value. Selective mowing and thinning of vegetation will also improve available forage and browse areas for wildlife.

Selective forest thinning should promote large diameter trees and diversity in the understory. This is particularly important in CT-E (Mixed Hardwood/Softwood Forest), which is in a state of transition. As the pines mature, and more light penetrates through the overstory, the oak/hickory community will become more established. The most important aspect in managing this changing community is to encourage its diversity and health. At present, the presence of Norway maple is most likely to threaten the successional development of this community.

Selective thinning should be conducted in accordance with recommendations from a professional forester. A minimum level of effort for this task will probably involve 2 –3 field days, in which the forester will mark trees designated for thinning with spray paint. If funds are available, it is recommended that a forester be hired to develop a comprehensive, long-term forest management plan.

Estimated Cost: The cost of hiring a forester to develop a forest management plan for the site will be approximately \$1,500 - \$2,000. Other services, such as marking designated trees for thinning are billed at an hourly rate of \$40-\$50 per hour.

Tree thinning costs will vary depending upon the number of trees to be thinned, as recommended by a forester. The cost for tree cutting is approximately \$4.60 per tree (up to 8 inches in diameter), and approximately \$6.90 per tree (up to 12 inches in diameter).

Priority: Medium, although hiring a forester to develop forest management recommendations should be given high priority.

- **Create brush piles:** Woody debris created by selective forest thinning should be used to create brush piles around the McLean open space area. Brush piles provide useful cover and nesting habitat for many species. Trees cut for thinning purposes should be left on the forest floor for use by wildlife.

Estimated Cost: Minor additional labor cost if brush piles are created in coordination with the selective forest thinning described above. Volunteer labor can also assist in creating brush piles.

Priority: Medium

- **Bird nest boxes and bat boxes:** Placement of bird nest boxes and bat boxes at appropriate locations throughout the property is a relatively simple way to create additional wildlife shelter. Guidance on the proper sizing, placement and maintenance of bird boxes can be obtained from the Massachusetts Audubon Society, which also sells a variety of bird boxes that are designed for specific bird species. Bird boxes need to be maintained and cleaned out at least once per year.

Estimated Cost: \$500-\$600 for 20 bird houses/bat boxes. High-quality, cedar bird houses and bat boxes can be purchased for \$25-\$30 per box. Volunteers can also make these boxes for a fraction of this cost.

Priority: High

- **Create additional snags:** Another way to improve wildlife shelter and cover is to create new snags (standing dead wood) throughout the forested portions of the property. Snags provide dead wood that is sought out by cavity nesting birds such as bluebirds, chickadees and most woodpeckers, as well as a variety of small mammals. In accordance with recommendations from a professional forester, snags of varying size could be created to provide cover and nesting for a wide range of wildlife species. It is

generally recommended that three snags of 12 inches dbh or greater should be available per forested acre. Snags should be well distributed, since cavity-nesting birds such as woodpeckers have large territories. Snags can be created by cutting or girdling sick or dying trees. Girdling involves cutting away the bark and cambial tissue around the trunks of selected trees. Girdling can either be coordinated with selective forest thinning activities or conducted with volunteer labor.

Estimated Cost: The estimated labor costs/volunteer time associated with this task will depend upon the number of new snags recommended by a forester.

Priority: Medium

3.1.3 Goal #3: Invasive Species Control

As described in Section 2.3.1 (Natural Community Types), a variety of invasive species are present in varying degrees throughout the McLean property. Invasive species are relatively uncommon in the mature hardwood forest and mixed hardwood-softwood forest areas that comprise the southern and eastern sections of the McLean property. However, in the successional forest and old field areas of Community Type F, invasive species exist at nuisance levels and have severely degraded the property by choking out native vegetation, reducing bio-diversity and generally creating poor-quality habitat for wildlife. Habitat diversity is also at risk, as the field areas become reduced in size and replaced by successional forest growth. The invasive species found on the property include non-native species and pioneer native species that can grow aggressively in disturbed areas, such as poison ivy.

A strategy for invasive species control should focus efforts on the heavily impacted areas of Community Type F and the open field areas being threatened by successional growth. Areas where relatively new or small infestations of non-native species occur should be given high priority, since effective control is much more difficult and costly after a species has become strongly established. With this in mind, an invasive species monitoring program should be established to (1) identify areas of new infestations and (2) set and revise invasive species management goals based on a regularly updated assessment of conditions.

In general, control of invasive species on the McLean property can be conducted with two methods, repeated cutting/cultivation and herbicide application. If regular mowing is resumed to maintain the open fields, sufficient control over woody invasive species (i.e. Glossy Buckthorn) should be achieved in these areas. In other areas, control efforts should focus on eradication of specific nuisance species while taking care to avoid unintended impacts to other native plant species. Selective cutting, pulling and root cultivation can be effective but require a significant amount of labor. For many species, multiple cuttings per growing season are required to deplete food reserves in the rhizomes and kill the plant.

Herbicides can provide effective control for many invasive species, but should be used prudently. Whenever herbicides are used, care should be taken to minimize impacts to nearby native vegetation, especially in sensitive areas such as wetlands. Herbicide applications should always be conducted according to label instructions, with handling and application procedures designed to protect both the applicator and environment from harmful exposure levels. When used properly and in the correct setting, herbicides can be an important tool in an integrated plan to reduce the negative impacts of invasive species on biodiversity and overall ecosystem health.



3.1.3.1 Invasive Plant Descriptions

Oriental Bittersweet (*Celastrus orbiculata*):

Species Description - Oriental bittersweet is a woody, perennial vine that is native to Eastern Asia. This vine grows aggressively and completely covers other plants, often eventually killing them by blocking sunlight, girdling, or uprooting them under the force of its weight. Although this plant tends to pioneer adjacent to open areas or where light disturbances have been created, it is quite shade-tolerant and can easily move into shaded forests. Regionally, this plant appears to be displacing the similar-looking native Climbing bittersweet (*Celastrus scandens*), which flowers at the tips of its stems rather than all along its stems.



Oriental bittersweet

Primary Locations - Oriental bittersweet is found throughout the northern section of the property, particularly the successional forest and old field areas identified as Community Type F. Dense growth is found in areas to the south and west of the Great Field. In some places, Oriental bittersweet has created a virtually impenetrable tangle of vegetation that severely degrades habitat values and inhibits forest regeneration. It should be noted that the vegetation inventory compiled by Cortell Associates (9/5/97) lists the native Climbing bittersweet at several locations, but does not list Oriental bittersweet. Given the extent of Oriental bittersweet found and the relatively large diameter of many of the vines, it is likely that this plant was simply misidentified in the Cortell study.

Control Methods – This plant is extremely difficult to control once it has become established. It reproduces prolifically by seed, and also expands vegetatively by stolons, rhizomes and root suckering. Cutting, mowing with equipment such as a brush hog, or hand pulling of vines can be somewhat effective. Cutting should be done before fruiting, to avoid dispersal of seeds. Although labor-intensive, the root systems of young plants can be dug out by hand. Systemic herbicides such as glyphosphate and triclopar have been used with some success when applied to bittersweet stems immediately after cutting. Unlike “contact” herbicides which only kill the portion of the plant that is directly contacted, systemic herbicides are taken into the roots and can kill the entire plant.

Japanese Knotweed (*Polygonum cuspidatum*)

Species Description - This herbaceous perennial plant has bamboo-like stems and grows in dense, monoculture stands that range from 1 to 3 meters in height. Once established, this species can spread quickly in open areas and disturbed areas with ample sunlight. Due to high light requirements, it does not appear to threaten undisturbed forests or other low sunlight areas. Japanese knotweed spreads primarily through its rhizomes, which can reach up to 20 meters in length.



Japanese Knotweed stem

Primary Locations - Japanese knotweed can be found in sections of the successional forest areas to the south and west of the Great Field, as well as the mixed forest area just east of the Belmont Day School sports field. Relatively small patches of Japanese knotweed were also found along the Coal Road cart path (Figure 4, Areas #14a and #14b) in the eastern section of the property. This path was recently widened to improve emergency vehicle access, possibly creating additional disturbance and light penetration that could promote further spread of Japanese knotweed along this corridor.

Control Methods – Japanese knotweed is extremely difficult to eradicate, due to its extensive rhizome systems and effectiveness at regenerating shoots after cutting. Studies have indicated that at least three cuttings are needed in a growing season to offset rhizome production. Either manual or mechanical cutting of the plant stalks is considered to be more effective than digging out the rhizomes, since digging tends to spread rhizome fragments which can regenerate into new plants. Several herbicides, including glyphosate and picloram, have been proven effective at controlling Japanese knotweed. Herbicide application is most effective when conducted in late summer following a late spring/early summer cutting.

Glossy Buckthorn / Common Buckthorn
(*Rhamnus frangula* / *R. cathartica*)

Species Description – Both of these invasive buckthorn species are most commonly seen in the form of a large, multi-stemmed shrub, but can also grow as a small tree reaching 20 feet in height. These plants tend to pioneer in a range of upland habitats, including woodland edges and old fields, and are highly shade tolerant. Glossy buckthorn also successfully invades wetland habitats such as pond edges and wet meadows, and can dominate in some wet areas to the near exclusion of other species. Spread of these plants is primarily attributed to birds such as the European starling which eat its fruit and thereby disperse seeds.



Glossy buckthorn

Primary Locations – The buckthorn species appear to be the most widely distributed invasive plants on the McLean property. Both species are well distributed throughout the northern section of the property, with dense growth found south and east of the Great Field, the abandoned orchard northwest of the Great Field, and around the Heart-shaped Field. Glossy buckthorn is also present in lesser amounts within the red maple swamp and around the vernal pool area.

Control Methods – Although a variety of methods can be used to control buckthorn, these plants are difficult to eradicate and all methods require persistent follow-up treatment. Young plants can be either cut or hand pulled, while older plants will require mechanical cutting or pulling. Buckthorn regenerates readily from roots and stems, making regular cutting necessary to maintain control. Cutting followed by hand-application of herbicides such as Trimec, Garlon or Roundup can provide effective control. Fire girdling of young trees with a five-second flame torch application has also been proven to kill the cambium of stems less than 4.5 cm in diameter.

Black Locust (*Robinia pseudoacacia*)

Species Description - This fast-growing southeastern tree can become a problem when dense groves choke out other native vegetation. Black locust tends to create shaded islands which reduce competition and allow little ground vegetation to establish. This tree pioneers disturbed areas such as old fields, degraded woods and roadsides. Black locust reproduces by root suckering and stump sprouting, creating groves of interconnected trees that share a common fibrous root system.

Primary Locations – An established stand of black locust Black locust is the dominant tree in the forested area adjacent to Concord Avenue, just north of the isolated vernal pool. This area extends west to the cemetery site, bounding the Heart-shaped Field to the north and east. The Heart-shaped Field is now in a successional stage, dominated by invasive



Black locust

saplings including black locust, buckthorn and staghorn sumac.

Control Methods – Mowing, cutting and burning can be used to reduce the spread of new shoots from parent tree. To kill the parent tree, more effective control can be achieved by applying a systemic herbicide such as glyphosate to freshly cut stems and stumps.

Tree-of-Heaven (*Ailanthus altissima*)

Species Description - This fast-growing Asian tree can aggressively out-compete surrounding vegetation in disturbed areas. Tree-of-heaven produces toxins which prevent the establishment of other species. It is a prolific seed producer, with individual trees capable of producing up to 325,000 seeds per year. It also persistently reproduces by vegetative sprouting from stumps or roots.

Primary Locations – Tree-of-heaven can be found in the successional forest areas to the west of the Great Field, including the wooded perimeter of the old field located to the west of the North Cottage and the Child Care Center. It was also documented within the mixed forest at the southwest corner of the property and in the area surrounding the southern end of the Coal Road.



Tree-of-Heaven

Control Methods – Hand pulling of young seedlings is considered the most effective method of control. Pulling seedlings after rain has loosened the soil facilitates removal of the root system, which can re-sprout if left in the ground. Larger plants that have developed a tap root will require digging or cutting. Saplings will normally require several cuttings before rhizome food reserves are depleted.

Norway maple (*Acer platinoides*)

Species Description - This invasive tree looks similar to the native Sugar maple, but can be distinguished by its wide leaves with milky sap. This tree was introduced as a commonly planted street tree, but has aggressively moved into forests throughout the region and threatens to outcompete the Sugar Maple.

Primary Locations – Norway maple can be found interspersed throughout the forest areas of the McLean property, including numerous mature specimens throughout CT-A (mature hardwood forest) and CT-E (mixed hardwood/softwood forest). Additionally, many saplings can be found in the successional forest area to the north of the red maple swamp.



A Norway maple leaf.

Control Methods – Large Norway maple trees can either be cut or girdled as part of a forest thinning plan. Saplings can either be cut or pulled.

Purple Loosestrife (*Lythrum salicaria*)

Species Description – Purple loosestrife is a perennial wetland plant that is easily distinguished in the summer by its showy spikes of magenta flowers. This plants reproduces and spreads prolifically, with one mature plant capable of producing over 2 million seeds annually.



Primary Locations – The small, isolated wetland areas located along the western fringe of the Great Field are heavily dominated by Purple loosestrife. Currently, this appears to be the only area within the McLean property that is infested with this plant.

Control Methods – Due to its prolific seed production, control of this plant is very difficult in places where it has become well established. Hand pulling of small purple loosestrife populations can be an effective, low-cost alternative to herbicide treatment. Biological control using several species of *Galarucella* beetles has also shown promising results.

Purple loosestrife

Poison Ivy (*Toxicodendron radicans*)

Species Description – Although it is a native plant, poison ivy is considered a nuisance species and a public safety threat due to the poisonous oil it produces. Contact with any part of the poison ivy plant can cause skin irritation. Poison ivy is most commonly found growing as a slender, three-leaved vine running along the ground, or growing on shrubs and trees.



Poison Ivy

Primary Locations – Poison ivy can be found growing densely in the area around the vernal pool to the south of Concord Avenue. It is also dense in the successional area at the southern edge of the Great Field, where in several spots it is encroaching on hiking trails. Poison ivy can also be found in a number of other areas within CT-F (Successional Forest with Invasive Species).

Control Methods – Poison ivy can be controlled either with repeated cutting or herbicide application. Repeated cutting at the ground surface can be effective, although this method presents a high risk of exposure to the plant's poisonous oil. Herbicide application is generally recommended for eradication in areas that do not permit cultivation and where some damage to other vegetation can be tolerated. Commonly used active ingredients that are effective in poison ivy control include glyphosate (Rodeo[®], Roundup[®], Kleenup[®]), amitrole (Amitrol-T[®], Weedazol[®]), and 2,4-D (Weed-B-Gon[®]).

3.1.3.2 Invasive Species Control Recommendations

- **Maintain Open Fields:** As previously discussed, brush cutting and regular mowing are recommended in the open field areas and adjacent portions of CT-F (Successional Woods with Invasive Species) that have developed into a successional pole sapling community in recent years. While the primary goal of this management practice is to maintain open field habitat, it simultaneously serves the practical purpose of controlling the buckthorn saplings and other invasive species which threaten biodiversity and degrade habitat in these areas. Although these species will readily grow back, biannual mowing should be adequate to insure that the habitat values of the open field community are maintained.

Estimated Cost: See Section 3.1.3.1

Priority: High

- **Coal Road - Japanese Knotweed Control:** Several small patches of Japanese knotweed along the Coal Road cart path (Figure 4, Areas #14a and #14b) should be targeted for immediate control. Japanese knotweed can spread rapidly in disturbed areas with ample sunlight. Given the disturbance from the

recent widening of the Coal Road for emergency vehicle access, and the additional sunlight penetration this allowed, there is a substantial risk that Japanese knotweed will spread. The recommended method of control is a late spring/early summer cutting, followed by an application of glyphosate (Rodeo®, Roundup®, Kleenup®) to cut stems in the late summer. Follow-up treatments should be conducted annually as needed.

Estimated Cost: Up to \$400 (for labor and herbicide in currently infested area), depending on availability of volunteer help for stem cutting. Herbicides should be applied by a licensed herbicide applicator.

Priority: High

- **Poison Ivy Control:** As needed to ensure public safety, poison ivy encroaching on hiking trails should be targeted for eradication. Several areas along trails at the southern and western edge of the Great Field could be targeted for immediate control. Control with a glyphosate product is recommended, and could be coordinated with the Japanese knotweed control efforts recommended above.

Estimated Cost: Up to \$400 for labor and herbicide. Herbicides should be applied by a licensed herbicide applicator. Costs can be reduced if coordinated with Japanese knotweed control.

Priority: High

- **Abandoned Orchard Trees:** As also previously discussed, the dense buckthorns and other saplings within the abandoned orchard area (Figure 4, Area #4) should be targeted for control. At a minimum, these areas can be brush-cut and mowed in coordination with cutting/mowing of the field areas. Depending upon funds, and as recommended by an arborist, areas may also be targeted for more intensive control to ensure that the apple trees are adequately released from competition.

Estimated Cost: See Section 3.1.3.1

Priority: Medium

- **Isolated Wetland Areas:** Several isolated wetland pockets are located along the western fringe of the Great Field, just east of the North Cottage (Figure 4, Area #3). Because these wetlands areas are very small (under 5,000 square feet) and isolated, they are not regulated under the Massachusetts Wetlands Protection Act and do not require federal regulatory review under the Army Corps of Engineers Programmatic General Permit. Several of these isolated wetlands are located within the construction debris area that is planned for restoration as required by the Memorandum of Agreement between McLean Hospital and the Town of Belmont. These areas are heavily dominated by Purple loosestrife, an extremely invasive wetland plant. Due to the small size of these wetland pockets, a program of hand pulling Purple loosestrife may be a feasible way to achieve control. The plants should be pulled by early June, before they begin to flower and disperse seeds in July. The entire rootstock must be pulled out since regeneration from root fragments is possible. Uprooted plants and broken stems should be removed from the area since the broken stems can resprout. Additionally, as part of the restoration of the debris area, an initial purple loosestrife removal effort could be conducted in conjunction with planting of beneficial native herbaceous wetland plants. Seeding with wetland seed mix is recommended. New England Wetmix, sold by New England Wetland Plants, Inc., is a seed mixture which is appropriate for wetland restoration sites that are not permanently inundated.

Estimated Cost: Handpulling of purple loosestrife – volunteer labor

Wetland seed mix: \$250 (2 lbs. at \$125/lb.)

Priority: Medium

- **Norway Maple thinning:** As discussed previously, Norway maple can be targeted as part of a selective forest thinning program. Large trees can either be cut or girdled and saplings can either be cut or pulled.

Eradication of this species is not suggested. However, managing the spread of this species is recommended.

Estimated Cost: Cost will depend on extent of thinning recommended by professional forester.

Priority: Medium/Low

- **Volunteer Monitoring:** Volunteers should be trained to recognize the invasive species on the McLean property, to assist in (1) keeping track of the spread of these species, (2) identifying new infestations before they become strongly established, and (3) to monitor the success of invasive species control efforts. The Massachusetts Division of Fisheries and Wildlife has produced a useful field guide, [A Guide to Invasive Plants in Massachusetts](#), which includes color photos and line drawings of the nuisance non-native plants found in Massachusetts. These field guides are free and can be used as a reference guide by volunteers. Once volunteers have been trained to identify problem species, monitoring can become an ongoing process that happens informally every time they use the open space for recreation. More structured invasive species monitoring can be organized several times per year, and may also be combined with efforts to control target species. For example, the Sudbury Valley Trustees conduct regular “Bittersweet Days”, when volunteer crews identify and manually cut down invasive Oriental Bittersweet vines that are damaging trees.

Estimated Cost: Volunteer labor

Priority: Medium

- **Vernal pool area:** The wetland/buffer zone area surrounding the certified vernal pool to the south of Concord Avenue (Figure 4, Area #16) is degraded by the presence of Glossy buckthorn, Common buckthorn, oriental bittersweet and a dense ground cover of poison ivy. However, these species are not a factor within the vernal pool itself, which self-regulates its species composition by virtue of a fluctuating surface water level. Intensive management within the bordering wetland/buffer zone is not recommended. However, buckthorn and other invasive plants may be selectively cut to promote the growth of highbush blueberry shrubs which have high wildlife food value.

Estimated Cost: Volunteer labor

Priority: Low

3.2 TRAIL MANAGEMENT

3.2.1 Trail Maintenance

As described in Section 2.4, a well-developed and popular trail network already exists on the McLean property. In addition to their use for public recreation, many of the trails are designated as access roads for emergency vehicles (Figure 12, Trails/Emergency Vehicle Access Roads). To maintain emergency vehicle accessibility, public safety personnel have required that these trails must be maintained at a width of twelve (12) feet and height of twelve (12) feet.

Transfer of the McLean open space land to protected conservation land may result in an increase in the number of visitors to the property, particularly if new signage, improved trailheads and parking areas are provided. While increased visitation may increase the need for trail maintenance, it can also serve to bring more local users to the property who are willing to contribute volunteer time towards the protection and stewardship of the land.

To foster ongoing citizen stewardship of the McLean open space, it may be beneficial to establish a trail committee to oversee trail maintenance and monitoring. Trail committees are generally comprised of people who frequently use the trails and have a strong interest in assuring that they remain in good condition. Trail committees can organize regular maintenance and monitoring activities by volunteer crews, and provide status reports to the Land Management Committee, Conservation Commission and other town officials as needed.

In general, the existing trail network is in good and stable condition, and has very limited immediate maintenance needs. However, the following improvements are recommended:

- **Pine Allee Maintenance:** Within the Pine Allee area, there are a several unhealthy trees that could be selectively cut. Planting white pine saplings in place of these trees will promote the long-term preservation and stability of this popular trail. Selective trimming of broken and/or dead limbs evident on the white pines could also be performed to improve the aesthetic view along this trail. Selective cutting should be based on the recommendations of a professional forester, as previously discussed in Section 3.1.1.
Estimated Cost: \$650 (total cost, based on labor cost for tree cutting and preparation/planting of five (5) 4'-5' tall white pine saplings)
Priority: Medium
- **Cut Encroaching Vegetation:** In conjunction with the planned removal of piles of construction debris and subsequent restoration of the degraded area to the east of the North Cottage, efforts should be made to upgrade the trails in this area (Figure 4, Area #3). These trails have become overgrown by encroaching vines, herbaceous plants and poison ivy. Any trail improvements should avoid impacts to the several isolated wetlands located in this area.
Estimated Cost: No additional cost if coordinated with recommended brush cutting/mowing. Trail clearing can also be done by volunteers.
Priority: Medium
- **Organize Volunteer Trail Crews:** Volunteer can assist with regularly scheduled trail maintenance days and special projects. Volunteer efforts can include such activities as cutting encroaching vegetation, clearing felled trees and branches, trail stabilization projects (as needed), trail marking, etc.
Estimated Cost: Volunteer labor
Priority: Medium

3.2.2 Trail Access

- **Parking:** As discussed in Section 2.5, public access to the McLean trails has been informal. No official parking areas outside of the McLean campus or signage marking trailheads exist at this time. However, several locations have the potential to provide a limited number of parking spaces:

Mill Street - At present, the McLean farmhouse/barn parcel provides several parking spaces at the end of a short roadway to the west of Mill Street. This area serves as an important link to the Rock Meadow Conservation Land and the parking area should be formally marked with signage visible from Mill Street. However, visitors using this parking area would be required to walk across busy Mill Street in order to access the main McLean open space area to the east. Improvements to pedestrian safety should be considered, such as installation of pedestrian safety signage and/or a striped crosswalk.

Pleasant Street - As mentioned in Section 2.5, the gated access to the Coal Road cart path at Pleasant Street has a turnout area large enough for several parking spaces. Due to the location of Pleasant Street and the steep upgradient slopes, the ability to expand this area to allow more parking spaces is limited. Any use of this area for parking must assure that access for emergency vehicles is maintained at all times.

Estimated Cost: \$25-\$100 per sign (depending upon size and material)

Priority: Medium

- **Trail Linkage to Development Zones:** Control of access to the existing open space trails from the proposed development zones should be addressed, since uncontrolled access will inevitably lead to the creation of numerous spur trails and associated damage to vegetation. Designated access trails should be created to link the development zones with the open space trails.

Estimated Cost: The cost of new trail creation for this purpose should be incurred by the developer.

Priority: High

3.2.3 Trail Marking, Signage and Maps

- **Trail Marking:** Trails should be marked for easier navigation of the trail system. The most common methods of trail marking are painted blazes and aluminum or plastic markers. Painted blazes are recommended as a simple and inexpensive way to mark trails. Painted blazes are resistant to most forms of vandalism that are common to other types of markers. Trail markings should be spaced at regular intervals, and provide information (such as a color or numbering system) that corresponds to the trail maps. Trail markings also ensure that trespassing onto private properties is minimized.

Estimated Cost: \$100 for paint, plus volunteer labor

Priority: High

- **Signage:** In addition to paper trail maps, permanent signage showing a map of the trail system and public use regulations could be installed at key trailhead locations. At a minimum, permanent signage or an information kiosk should be installed at any formal parking areas that are created.



Example of a simple trailhead kiosk.

Public education about the McLean property can also be enhanced through the use of interpretive displays throughout the trail system. Interpretive signage can be in the form of small signs that describe an ecological or historic feature along a trail. Alternatively, a “self-guiding” interpretive trail can be developed as part of the paper trail maps, with locations and feature descriptions given in the map to correspond to numbered stations along the trails. Potential locations for interpretive displays include (1) sites which can be used to highlight the unique features of each natural community on the property, (2) sites which educate visitors about the ecological threat of invasive species or discuss natural succession, and (3) sites which highlight the history of the property, such as the Chenery Barn foundation and the Coal Road.

Estimated Cost: Costs will vary depending on the desired level of effort. Construction/installation of simple information kiosks is estimated at \$400 per kiosk (labor and materials). Signage for designated parking areas and trailheads will cost approximately \$25-\$100 per sign, depending on size and material of the sign.

Priority: Medium

- **Trail maps:** A map should be designed to allow visitors easy navigation of the McLean trail system, while also serving to educate trail users about public use policies on the property. The trail maps should clearly indicate private property boundaries and the active and inactive cemetery boundaries. The maps can also include interpretive information that informs users of the interesting ecological and historic features of the property as they use the trails. Trail maps can be made available at town offices and libraries, as well as at selected trailhead areas.

Estimated Cost: \$125-\$250 per 1000 copies (depending upon paper stock, colors, 1- or 2-sided)

Priority: Medium

3.3 PUBLIC USE POLICIES

A determination on the types of allowed uses on the McLean property should be made with public input from stakeholder groups. The Town of Belmont-Land Management Committee was created specifically to play the key role in determining public use policies for public open spaces. In conformance with the conservation restrictions on the property, property uses may include hiking, cross-country skiing, bird-watching, and other forms of passive recreation. Some recommendations on specific public use policies are given in the following sections.

3.3.1 Pet Policy

The McLean property is a popular spot for dog-walking. To avoid conflicts between pet owners and other recreational users of the property, a Pet Policy should be established. The following regulations, adapted from the Pet Policy of the Massachusetts Division of Forests and Parks, are suggested:

- Pets must be restrained by a leash, not to exceed ten feet in length, at all times.
- Persons bringing pets on the property are responsible for the removal and appropriate disposal of animal feces.
- Pets shall not be left unattended on the property.
- Pets shall be kept under the control of its owner and shall be prevented from interfering with any other visitor's enjoyment of the property.
- Pets must be kept on designated trails, and not allowed to freely roam adjacent open space areas.

Although dog walking may be the most common and obvious pet-related land management issue, attention should also be paid to free-roaming domesticated cats from the surrounding neighborhoods. Cats are highly skilled predators, and can seriously impact bird populations when allowed uncontrolled access to hunt in protected open spaces. Public education efforts geared towards local property owners can help to minimize this problem.

3.3.2 Bicycle Policy

Historically, hikers and mountain bikers have shared unrestricted, although informal, access to all of the trails within the McLean property. Many of these trails, particularly the emergency vehicle access paths (see Figure 12), are wide enough to function very well as multiple-use trails for hikers and bikers. However, the conservation restrictions recently established for the open space parcels specifically prohibits the use of bicycles. Considering the regular use of these trails by mountain bikers, a public education effort will be necessary to ensure that the new conservation restrictions are adhered to. This effort should include placement of signage and trail-use regulations at trailheads.

Many well-known local and regional trail networks promote use of a combination of multi-use and hiking-only trails. If, at some point in the future, the Land Management Committee proposes to designate trail uses to be assigned to the McLean trails, the designations should be made at the local level and should involve input from stakeholder groups that use the trails. When considering if the designation of trail uses is desired for the McLean property, the following guidelines may be useful:

- Trail use designations should be assigned to promote safety, protection of sensitive ecological resources such as wetlands, and overall enjoyment of the trail system.
- Multi-use and hiker-only trails provide a fundamentally different experience to trail users. Hiker-only trails can provide a quiet retreat from mechanical conveyances that many trail users seek.
- Multiple-use trails must be wide enough to allow for safe passing and two-directional use, and should have sufficient sight lines to prevent collisions. The emergency vehicle access paths shown in Figure 12 are trails which appear to meet these criteria.

- Steep and/or narrow trails should be single use.

3.4 CULTURAL RESOURCES MANAGEMENT

All current and future uses of the McLean Open Space should be managed to preserve the historic and archeological features of the property. As previously stated, the 1998 PAL study determined that any disturbance to historic or archeologically sensitive resources from footpaths is considered minimal. This assessment has been refined in the updated PAL study submitted to the Massachusetts Historical Commission and the Belmont Historic District Commission. The trail system serves to concentrate human impact in a relatively confined area, thus limiting the potential for impacts at other potentially sensitive areas on the property. Assuming that most of the public use of the McLean Open Space will take place on the existing trail network, management recommendations related to cultural resources are limited to the following:

- **Archeological Resources Protection:** In the event that new trails are proposed at some point in the future, the areas documented by PAL as having “high sensitivity” for Native American archeological deposits should be avoided. A map identifying these areas is included as Figure 2 in the PAL study, which is attached as Appendix 2 of this report. If trails are proposed in any of these areas, additional site investigation by a qualified archeologist should be conducted to ensure adequate protection of archeological resources. As no new trails in these areas are anticipated, no costs associated with this recommendation are anticipated.
- **Chenery Barn area:** The stone foundation of the historic Chenery barn (Figure 4, Area #5) should be maintained on an as-needed basis. Also, the grass in the surrounding area should be mowed in the summer so that visitors may have better access to view this historical point of interest.
Estimated Cost: Mowing should be coordinated with Recommendation #1. The cost of hiring a stone mason will depend on the extent of repairs needed. Volunteer labor may also be used for simple repairs/maintenance.
Priority: Medium
- **Coal Road stone walls:** On an as needed basis, the stone walls which line a portion of the Coal Road should be maintained and repaired. At present, these walls seen to be in good condition and show no immediate need for maintenance.
Estimated Cost: The cost of hiring a stone mason will depend on the extent of repairs needed. Volunteer labor may also be used for simple repairs/maintenance.
Priority: Low
- **Orchard trees:** As previously discussed in Section 3.1.2, pruning the abandoned orchard trees on the property and cutting back competing invasive vegetation will help enhance wildlife food sources. This activity will also help preserve an element of the site’s historic agricultural land use.
Estimated Cost: \$600/year
Priority: Medium/Low

3.5 SCENIC VIEW MANAGEMENT

- **Townhouses visible from Lone Tree Hill:**

The expansive view across the Great Field from Lone Tree Hill is perhaps one of the most popular features of the McLean property. The planned construction of townhouses in Residential Zone 1A threatens to alter this bucolic vista by introducing a number of buildings to the viewscape. For this reason, a landscaping plan will be required as a condition of site plan approval. A landscaping plan including vegetative screening between the Zone 1A and the open space has been developed by the Town and the developer. This plan includes plantings within the open space, which will help minimize impacts to scenic views from the Great Field. Without vegetative screening, the views from Lone Tree Hill are particularly at risk during the winter, when leaves are off of the deciduous vegetation between the North Cottage and the Great Field.



Existing row of vegetation between the Great Field and Residential Zone 1A.

In general, vertical stratification in the vegetative layers should be promoted in all areas near or adjacent to the proposed development zones. A landscaping plan that involves a multi-story approach using tall evergreens, flowering trees and shrubs could provide view screening from the developed area, while also being aesthetically pleasing and providing habitat and food values for birds and mammals.

Planting white pine and spruce as the overstory would provide a year-round visual barrier, and would be consistent with the vegetative perimeter formed by the Pine Allee at the northern edge of the Great Field. Mature white pines will reach heights of around 80 feet, although it will take many years for the trees to achieve this height. An under-canopy of trees and shrubs at the edge of the Great Field can include such species as flowering dogwoods, viburnum, hawthorne, mountain laurel, and other species that will add visual interest and provide food values for wildlife. Canadian hemlock, a popular screening species, is not recommended due to the recent proliferation of the hemlock wooly adelgid in this area.

Estimated Cost: No additional costs if all landscaping related to view screening are incorporated into the development costs of Residential Zone 1A.

Priority: High

- **Establish Viewing Area(s):** A scenic viewing area could be established near the top of the sloped open field area at the edge of the pitch pine stand in the northwestern corner of the property. This area has open ledge outcroppings, long-distance views to the west, and is adjacent to a fairly unique habitat and landscape type. Establishing a viewing area can be as simple as identifying the location on a trail map, or can also include placement of interpretive signage and a bench. Interpretive signage could include information about the history of the McLean property, the ecology of the adjacent pitch pine community and the process of forest succession.



View northwest from potential scenic viewing

Estimated Cost: No additional cost if viewing area is only identified on a trail map. Optional costs are estimated at \$350-\$650 for purchase/installation of a park bench and interpretive display.

Priority: Low

3.6 PROPERTY MANAGEMENT RECOMMENDATIONS – SUMMARY TABLE

RECOMMENDATION	ESTIMATED COST	FREQUENCY (TIMING)	PRIORITY
Natural Community Management:			
1. Maintain open fields	Mowing: \$2,640 - \$4,060 for 12-14 acres Brush Cutting: \$1,800 - \$2400	- Mow: Biannual (Sept.-Oct) - Cut: One time	High
2. Maintain edge effects	No add'l costs if coordinated with Recommendation #1	See #1	High
3. Pitch pine woodland mgt.	- if natural succession is allowed, no cost - if controlled burn, coordinate with fire department(s)	- NA - every 3-5 yrs.	Medium
4. Prune apple trees/ restore fruiting	\$400-\$600 for professional arborist (one day of labor)	Annual (October)	Med./Low
5. Forest thinning plan / long-term forest mgt. plan	- if tree-marking for forest thinning, \$40 - \$50 per hour; - if develop forest mgt. plan, \$1,500 - \$2,00	- One time - One time	High
6. Selective forest thinning	Cost varies with extent of thinning: \$4.60 - \$6.90 per tree	Varies	Medium
7. Install bird houses / Bat boxes	\$500-\$600 (20 houses/boxes at \$25-\$30 each)	One time, clean annually	High
8. Create additional snags	Labor / volunteer time as recommended by forest mgt. plan	Varies	Medium
9. Japanese knotweed control	\$400 (cut plants, licensed herbicide applicator)	Annual, as needed (spring-summer)	High
10. Poison ivy control	\$400 (herbicide application)	Annual, as needed (spring-summer)	Medium
10. Purple Loosestrife control	Volunteer hand pulling, \$250 for wetland seed mix (2 lbs.)	Annual, as needed (early June)	Medium
11. Norway maple thinning	No additional cost - coordinate with Recommendation #6	Varies....see #6	Medium
12. Invasives monitoring	Volunteer labor	Annual	Medium
Trail Management:			
13. Pine Allee maintenance	\$650 (cut unhealthy pines, replant 4'-5' saplings)	One time	Medium
14. Cut encroaching plants	No add'l cost if coordinated with Recommendation #1	See #1	Low
15. Volunteer trail crews	Volunteer labor	Annual	Medium
16. Parking Areas :	\$25-\$100 per sign	One time	Medium
17. Trail Marking (blazes)	\$100 (paint), volunteer labor	Every 3-5 yrs.	High
18. Trail Signage	\$400-\$500 per kiosk (labor/materials); \$25-\$100 per sign	One time	High
19. Trail Maps	Printing costs: \$125 - \$250 per 1000 copies	Varies	Medium
Public Use Policies:			
20. Pet / Bicycle Policies	No costs anticipated.	Infrequent	Low
Cultural Resources Management:			
20. Archeological resources protection	No costs anticipated	Infrequent	Low
21. Stone wall maintenance	Volunteer labor. Labor costs for a stone mason will vary.	As needed.	Low
22. Chenery Barn area maintenance	- Mowing should be coordinated with Recommendation #1 - As needed, labor costs for a stone mason will vary.	- See #1 - As needed	Low
23. Restore orchard trees	See Recommendation #4	See #4	Med./Low
Scenic View Management:			
24. Lone Tree Hill view screening	Costs to be incurred by developer	One time	High

25. Scenic viewing area	Varies with level of effort, 0\$-\$650 (i.e., park bench, signs)	One time	Low
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