# Land Management Plan

## A Narrative for Invasive Plant Management and Native Plant Restoration

239 Concord Road
Sudbury, MA

May 24, 2021

PARTERRE
ECOLOGICAL

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## Introduction and Primary Goals

The Zimmermann residence is located at 239 Concord Road in Sudbury. A portion of the property lies within the 100' wetland buffer and the property backs up to land managed by Sudbury Valley Trustees (SVT). An inventory of existing native and invasive plant species can be found in this plan.

The primary goal of this plan is to seek approval from the Sudbury Conservation Commission to offset the installation of a fence and regrading an eroded portion of lawn within the 100' Wetland Buffer. We propose control of all invasive plant species identified on site and 50' into SVT managed lands and restore the native plant community along the southwest property line.

Additionally the wetland buffer has identified invasive plant species that we propose removing by manual hand methods and cut & dab herbicide application. The plan proposes removal of invasive understory species across the wetland buffer and restoration of native species (beyond wetland requirements) of native species to accessible areas dominated by invasive species.

Pagoda Dogwood (Cornus alternifolia) growing along the boundary of the Sudbury Valley Trustees boundary. The Land Management Plan proposes offsetting landscape enhancement construction by controlling invasive species populations and restoring areas with native plant species that will further support wildlife along the boundary.

## 239 Concord Road
### Invasive Plant Inventory

Mature invasive species have developed isolated populations along the boundary to land managed by Sudbury Valley Trustees and threaten to spread into an otherwise healthy native ecosystem. We propose controlling invasive plant species that have developed self sustaining populations on the Zimmermann property and restoring with native species. Additionally, we propose control of invasive species 50' within the Sudbury Valley Trustees boundary to protect the healthy ecosystem from further incursion. The physiology of the invasive plants has enabled them to out compete the native plant community and compromise the ecological value of the native plant community. The dominant invasive plants, including Bittersweet, along the woodland edge poses a safety hazard as it entangles native tree species and disrupts the formation of a healthy understory. All invasive shrubs proposed for control will be removed from the site. Poison Ivy is a native species with valuable ecological benefits. We propose control the vine along the proposed fence line and areas of human traffic.

***Invasive Plant Species Identified:***

*Acer platanoides, Norway Maple*
*Alliaria petiolata*, Garlic Mustard
*Berberis thunbergii,* Japanese Barberry
*Celastrus orbiculatus,* Asiatic Bittersweet
*Euonymus alatus,* Burning Bush
*Frangula alnus,* Glossy Buckthorn
*Lonicera morrowii,* Morrow's Honeysuckle
*Rosa multiflora,* Multiflora Rose

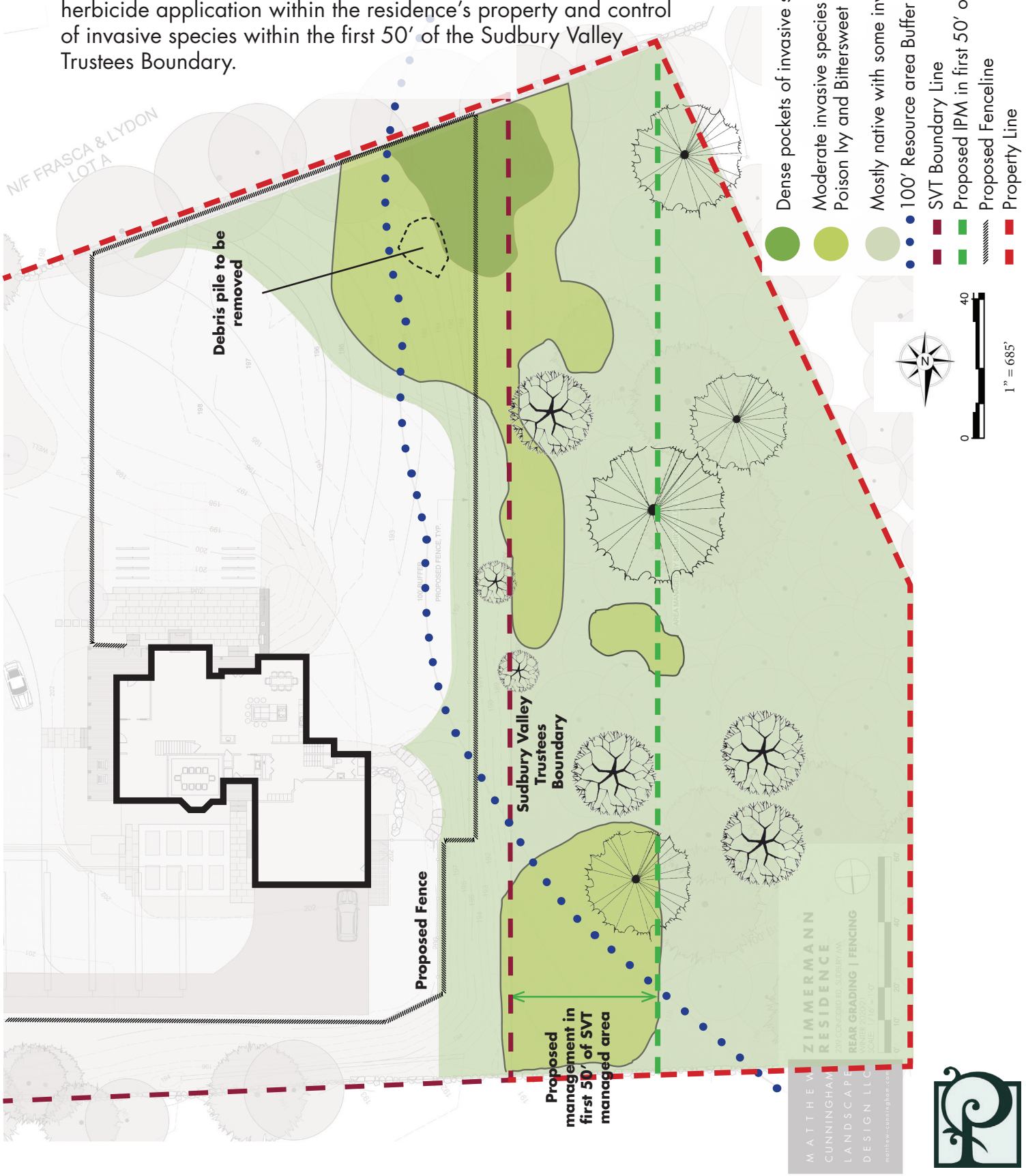
****Likely Invasive Plant Species Identified:***

Ligustrum vulgare, Wild Privet

* While not listed as an Invasive Species by MIPAG (Massachusetts Invasive Plant Advisory Group) these species can dominate the shrub layer and crowd out native trees and shrubs. We recommend removal of Wild Privet along with listed invasive plant species in wetland buffers and replace with native shrubs and trees. Although Poison Ivy is a native species with valuable ecological benefits, we propose control of the plant along the proposed fence line and other areas of human traffic

Bittersweet climbing a native Chokecherry (Prunus virginiana) along the southern property line. Climbing vines threaten to suppress or replace the native shrub understory.

Along the East border is a dense patch of Honeysuckle and Privet. Isolated pockets of invasive shrub species exist within the first 50' of Sudbury Valley Trustees (SVT) managed property among an otherwise healthy ecosystem. At the southwestern corner of the property are patches of Bittersweet, Garlic Mustard, and Burning Bush. We propose removing by manual hand methods and cut & dab herbicide application within the residence's property and control of invasive species within the first 50' of the Sudbury Valley Trustees Boundary.



# 239 Concord Road
## Invasive Plant Images

A dense patch of Privet (Ligustrum sp.) along the southwestern property line

Japanese Barberry (Berberis thunbergii) threatens to spread into healthier areas

Garlic Mustard (*Alliaria petiolata)* growing in dense patches in the area proposed for regrading

Oriental Bittersweet (*Celastrus orbiculatus)* berries climbing a snag along with Poison Ivy

Bittersweet amongst Burning Bush (*Euonymus alatus)*

Oriental Bittersweet (*Celastrus orbiculatus)* berries climbing a Spicebush (Lindera benzoin). Burning Bush, *Euonymus alatus,* was historically planted along the edge of the lawn and has begun seeding itself into the woodland understory.

Multiflora Rose (*Rosa multiflora*) among *Rubus sp.* in the open area along the southwest border

# 239 Concord Road

## Invasive management techniques

We propose a combination of manual hand removal and cut & dab herbicide to control invasive plant species within the identified project areas over a phased time line. Once the initial identified invasive plant species have been removed by manual methods (described below), we propose seeding all exposed soil with native seed blend and begin planting identified tree, shrub and perennial plant species selected from the native plant community list that will increase the density and diversity of the existing wetland buffers.

**Manual Hand Removal Methods:**
Manual methods of invasive plant management will include hand pulling or cutting. To minimize soil disturbance, shallow-rooted invasive plants less than 1" in caliper will be hand pulled from the soil. Invasive plant species greater than 1" in diameter will be cut. All invasive plant material will be disposed of off site. Manual hand pulling and cutting will remove all invasive plants from the wetland buffer.

**Cut and Dab and Foam application:** All invasive plant species that have a base greater than 1" in caliper are proposed for herbicide application methods. Although invasive, the root systems of plants greater then 1" in caliper usually have extensive fibrous root systems, providing soil stabilization. So we propose a cut & dab method of application of a Triclopyr based herbicide (Garlon) or Glyphosate based herbicide approved for wetland use (trade name Rodeo) on individual cut stumps. Licensed Pesticide Applicators will complete all aspects of the proposed restoration. For treatment of perennial species that cannot be controlled with cut and dab or by manual methods should be treated by a foam based herbicide that limits any treatment of non-target plants

Qualified applicators with necessary Personal Protective Equipment paint the stems of invasive species after cutting

Proposed cut stump treatment (below) using hand tools and applying marking dye to eliminate possibility of treatment of stump twice, or missing stump entirely. (Above) Foam treatment allows highly specific placement of herbicide to remove invasive perennials that limits disturbance and protects surrounding species

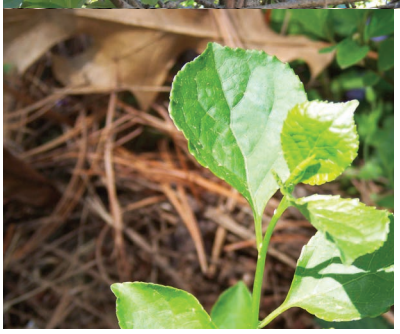
# 239 Concord Road

## Asiatic Bittersweet ID and Management

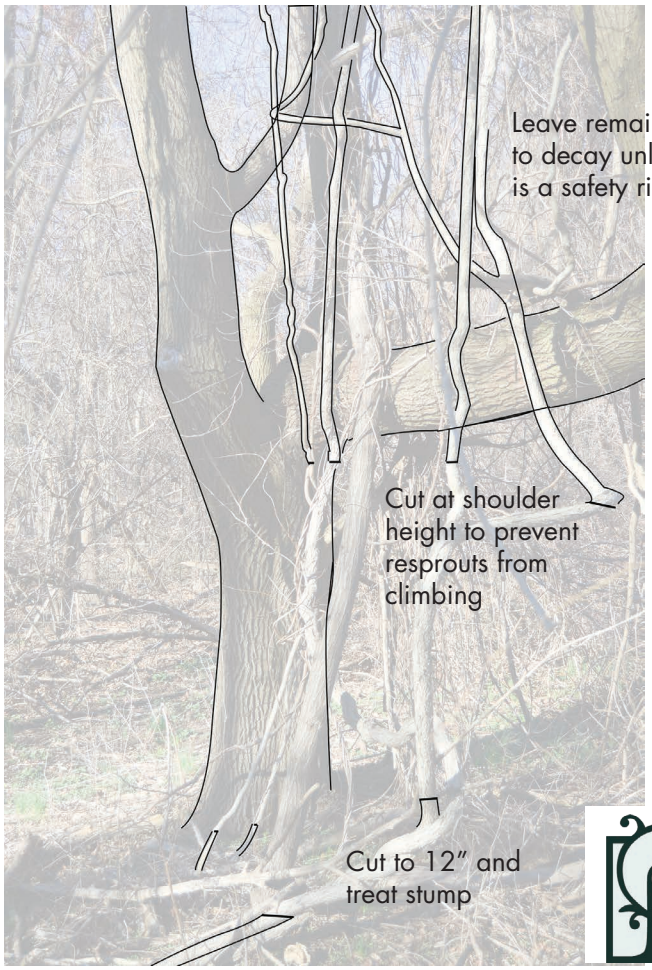
Invasive Bittersweet (*Celastrus orbiculatus)* have the capacity to girdle, weaken, and even kill mature canopy trees. Without some frequency of removal, they will eventually open large holes in the canopy while suppressing saplings from filling the holes. They readily resprout after being cut and can damage the aesthetic and ecological value of meadows.

Mature stems produce thousands of bright red berries that mature in late fall and are spread by birds.

Removing the entire vines from trees is often dangerous and unnecessary (unless it poses safety risk). Our team recommends making cuts at shoulder height followed by a cut at 12" and immediate herbicide treatment. Bittersweet aggressively suckers after cutting so it is important to cut and treat during or after its flowering period (late June to December).



Identification: Alternate, circular light green leaves 2-5 in. long. Distinctive, large light colored vine. Red berries with orange casing appearing in late fall. Seedlings have light green leaves. Deep orange roots.



**Management Calendar for Treatment and Planting**

| Task | March/ April | May | June | July | August | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|
| *Remove Garlic Mustard and Lesser Celandine seedlings by hand or smothering* | | | | | | | | | |
| *Cutting of Glossy Buckthorn, Norway Maple, and Honeysuckle* | | | | | | | | | |
| *Cut and dab of woody invasive species* | | | | | | | | | |
| *Invasive management in wetland areas* | | | | | | | | | |
| *Invasive vine management and cut and dab treatment* | | | | | | | | | |
| *Restoration planting* | | | | | | | | | |

*Optimal timing and efficiency*

*Not optimal but mostly effective*

*Possible, but not ideal*

## 239 Concord Road
### Native Plant Inventory

Within the wetland buffer is a diverse native plant community dominated by Red and White Oaks, Red Maple, and Shagbark Hickory. Chokecherry, Black Cherry, Winterberry, Highbush Blueberry and Spicebush are in the understory shrub layer with areas of dense Ostrich and Sensitive Fern and Virginia Creeper as a ground cover. We propose utilizing these existing native plant species as indicators of what naturally inhabits this plant community and propose additional planting of these species and diversifying with other native trees, shrubs and perennials.

Native Plant Species Identified:

*Acer rubrum,* Red Maple
*Aster divarcatus*, White Wood Aster
*Athyrium filix-femina*, Lady Fern
*Carya ovata*, Shagbark Hickory
*Carya cordiformus*, Bitternut Hickory
*Ilex verticillata,* Winterberry
*Lindera benzoin*, Spicebush
*Matteuccia struthiopteris,* Ostrich Fern
*Onoclea sensibilis,* Sensitive Fern
*Parthenocissus quinquefolia,* Virginia Creeper
*Pinus strobus*, Eastern White Pine
*Prunus serotina,* Black Cherry
*Prunus virginana,* Chokecherry
*Toxicodendron radicans,* Poison Ivy
*Quercus rubra,* Red Oak
*Quercus bicolor*, Swamp White Oak
*Solidago caesia*, Blue-stem Goldenrod
*Swida alternifolia,* Pagoda Dogwood
*Swida sericea,* Red-twig Dogwood
*Vaccinium angustifolium*, Low-bush Blueberry
*Vaccinium corymbosum*, High-bush Blueberry

Spicebush (Lindera benzoin) buds swelling in preparation for an early Spring bloom

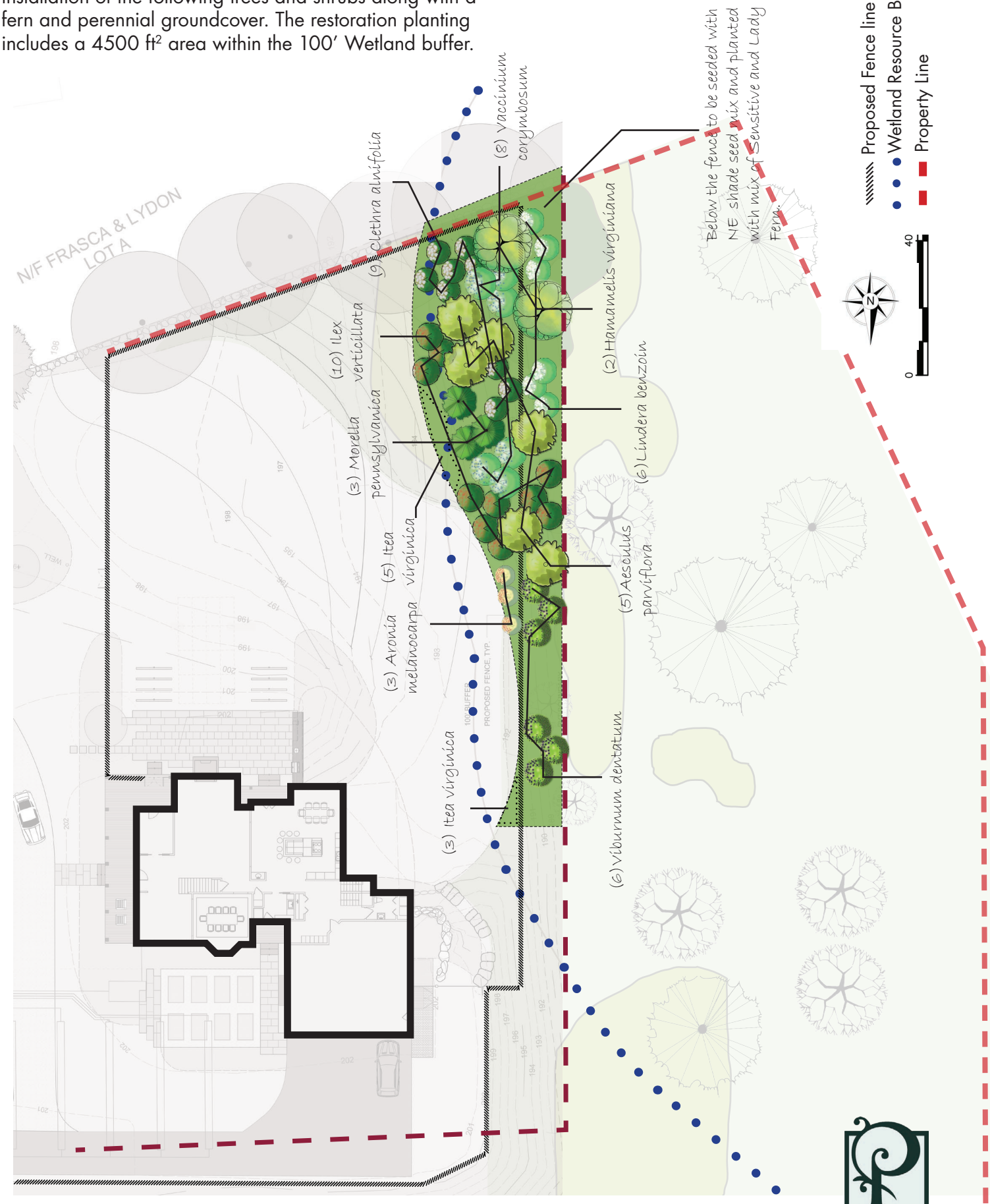
Winterberry amongst White Pine. Male specimen must be on site to produce berries on female plants

## 239 Concord Road
### Invasive Plant Images

Sensitive fern, Ostrich Fern and Lady Fern below a canopy of Black Cherry, Choke Cherry, and Swamp White Oak. While some invasive species occur in dense patches, the area leading to the wetland has a diverse set of native species common in a Red Maple wetland.

Shagbark Hickory sapling amongst the fern understory. Selected native species reflect the diverse existing habitat

Too offset regrading, fence installation, and invasive species management within the 100' wetland buffer we propose installation of the following trees and shrubs along with a fern and perennial groundcover. The restoration planting includes a 4500 ft² area within the 100' Wetland buffer.



After invasive plant species have been removed from the wetland buffer, the area will be planted with one to five gallon native conservation grade New England native trees, shrubs and perennials from local seed and cutting sources. It is proposed that native plants will have greater than 90% coverage by the conclusion of the 3 year Order of Conditions. Native plants proposed for installation will add diversity of existing native plants, provide habitat and forage for wildlife, and reduce storm water and sediment flow wetland areas. Plants proposed for installation include:

| | Quantity | Size | Scientific name | Common name |
|---|---|---|---|---|
| *Within 100' Wetland Buffer* | 5 | 3-4' | *Aesculus parviflora* | Bottlebrush Buckeye |
| | 3 | 3 gallon | *Aronia melanocarpa* | Black Chokecherry |
| | 24 | 1 gallon | *Athyrium filix-femina* | Lady Fern |
| | 9 | 18-24" HT | *Clethra alnifolia* | Summersweet |
| | 86 | 1 Gal | *Dennstaedtia punctilobula* | Hayscented Fern |
| | 2 | 6-7' HT. | *Hamamelis virginiana* | American Witchazel |
| | 8 | 1 gallon | *Itea virginica* | Virginia Sweetspire |
| | 10 | 3 gallon | *Ilex verticillata* | Winterberry |
| | 6 | 3 gallon | *Lindera benzoin* | Northern Spicebush |
| | 3 | 5 gallon | Morella pensylvanica | Northern Bayberry |
| | 48 | 1 gallon | *Onoclea sensibilis* | Sensitive Fern |
| | 6 | 2-3' HT. | *Viburnum dentatum* | Arrowwood Viburnum |
| | 8 | 3 gallon | *Vaccinium corymbosum* | High Bush Blueberry |

After planting the conservation grade native shrubs and trees and slope stabilizing perennials, we propose the area be seeded with a Conservation Wildlife mix at recommended seeding rates. This dense seed mix will supply a matrix of vegetative growth to cover disturbed soils, and reduce recolonization of invasive plant species.

Species to be seeded include:
*Virginia Wild Rye (Elymus virginicus), Little Bluestem (Schizachyrium scoparium), Big Bluestem (Andropogon gerardii), Red Fescue (Festuca rubra), Switch Grass (Panicum virgatum), Partridge Pea (Chamaecrista fasciculata), Panicledleaf Tick Trefoil (Desmodium paniculatum), Indian Grass (Sorghastrum nutans), Blue Vervain (Verbena hastata), Butterfly Milkweed (Asclepias tuberosa), Black Eyed Susan (Rudbeckia hirta), Common Sneezeweed (Helenium autunale), Heath Aster (Asterpilosus/Symphyotrichum pilosum), Early Goldenrod (Solidago juncea), Upland Bentgrass (Agrostis perennans).*

## 239 Concord Road
## Maintenance Schedule

The recommendations for restoration take into consideration the long term health of the wetland. Once the invasive plant species have been managed in a locus area and any native plants installed, a long-term maintenance plan will be set in motion with the goal of continued control of invasive plant species on site, serve, and sustain native plant populations, and improve the native plant diversity and aesthetic beauty of the wetland.

**Summer-Fall 2021**

- Cut and dab application to invasive shrub and tree species
- Utilizing control methods of invasive plant management to exhaust seed bank (Preventing disperal of seed heads, fruit of invasive shrubs)
- Hand pull invasive seedlings less than 1" in diameter
- Stem treat invasive perennials as needed and remove all seed heads
- Prep are to be graded by removing any remaining invasive debris so area can be smothered
- Cover any exposed soils with the approved seed mix

**Spring 2022**

- Manage spring invasives including Garlic Mustard and Greater Celandine to ensure they do not add to seed bank.
- Begin planting native plant species according to approved quantities and varieties
- Cover any exposed soils with the approved seed mix

**Summer-Fall 2022**

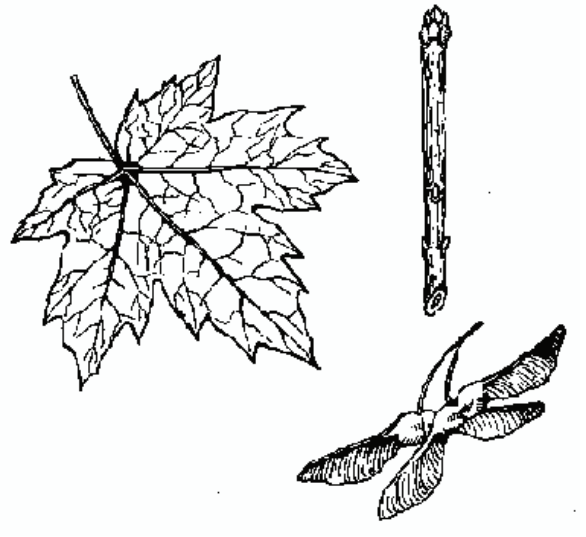
- Followup Cut and dab application to invasive shrub and tree species
- Hand pull invasive seedlings less than 1" in diameter
- Stem treat invasive perennials as needed and remove all seed heads
- Continue planting as needed and monitor health
- Cover any exposed soils with the approved seed mix, provide leaf mulch in upper beds

**Spring 2023-Fall 2023**

- Monitor plant response and continue hand pulling and herbicide application methods on re sprouting invasive plant species
- Cover exposed soils Conservation seed mix

**Ongoing Maintenance and Monitoring:**

- After the treatments of fall 2023, the management plan should be re-evaluated. If management treatments have been successful, only monitoring and minimal hand removal should be required to keep invasive plant species from being reintroduced. Native trees, shrubs, and herbaceous forbs should dominate the wetland buffer.
- Implementation of the LMP should be completed by qualified professionals including:
  Licensed pesticide applicator
  MA Certified Massachusetts Invasive Species Management
  MCH Massachusetts Certified Horticulturist
- Monitoring reports shall be submitted to conservation at the end of each growing season indicating invasive species management efforts and establishment of the restoration plantings.



## Norway Maple

***Description:***

*Acer platanoides,* Norway Maple is a tree occurring in all regions of the state in upland and wetland habitats. It is especially common in urban areas. It grows in full sun to shade. It out-competes native vegetation, including sugar maple, Acer saccharum which it is frequently confused with. Norway autumn color is yellow, while Sugar is orange/red. Norway has white sap, while Sugar has clear sap in the petiole (stems). Norway maple leaf points reduce to a fine "hair", while the tips of the points on Sugar leaves are rounded.

***Habitat:***

Norway maple is well adapted to various soils, grows in dry conditions, and can tolerate areas of soil pollution. Norway maples were widely planted in the United States as street trees and have escaped to natural habitats. Trees produce large numbers of seeds that are wind dispersed and invade natural areas, displacing native trees. Quickly establishing, they create a canopy of dense shade that prevents regeneration of native seedlings. Although thought to have allelopathic properties (meaning that the plant releases toxins that inhibit or prevent the growth of other plants), research has not been able to confirm this.

***Management:***

Manual methods of hand-pulling seedlings is recommended. For larger saplings, a 'Weed Wrench' is effective. Mature trees can be cut and the stump ground, or apply a Triclopyr based herbicide to the stump. Girdling the tree by cutting through the bark (cambium) layer all around the trunk is also an option. Girdling is most effective in spring and should include reducing the canopy for safety, but consider leaving trunks for habitat value.

*Acer platanoides*,
Norway Maple

**Bittersweet**

***Description:***

*Celastrus orbiculatus,* Asiatic Bittersweet is a deciduous climbing vine common in areas of disturbance in our New England forests. It has glossy, rounded leaves that are alternate with finely toothed margins. The leaves turn yellow in the fall. The fruiting plants produce small greenish flower clusters from leaf axils that mature in fall to produce high numbers of fruiting seed. The seed are noticeably yellow, globular capsules that split open at maturity to reveal red-orange fruiting seeds. Roots are also distinctly orange.

***Habitat:***

Bittersweet spreads easily into forest edges, woodlands, unmanaged meadows and old fields. Most disturbed sites that are not being actively managed that receive full sun are susceptible. The vine can tolerate shade but is often found in more open, sunny areas.

***Management:***

Asiatic Bittersweet management is a combination of manual hand pulling with cut & dab herbicide treatments. For established plants, vines should be cut to ground to reduce mass. Persistent root infestations will require repeat cutting and treatments over several seasons. Rake any seeds present, bagging in plastic bags, tying, and disposing of correctly.

*Celastrus orbiculatus,*
Asiatic Bittersweet

## Honeysuckle

***Description:***

*Lonicera morrowii,* Morrow's honeysuckles are upright, deciduous shrubs that typically have a multi-stem mounding appearance. Oval leaves are opposite along the stem with smooth edges (no teeth or lobes) and hairy on the underside. Mature stems are often hollow on the interior and peeling on the outer bark. In the spring pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. The fruits are red to orange, and fleshy .

***Habitat:***

Honeysuckles are relatively shade-intolerant and most often occur in forest edges, abandoned fields, and other open, upland habitats. Woodlands and open meadows, especially those that have been grazed or otherwise disturbed and are left unmanaged are also highly susceptible. Morrow's Honeysuckle have the greatest habitat diversity and are capable of invading wetland edges and other uncommon habitat types.

***Management:***

Morrows Honeysuckle management is a combination of mechanical mowing and manual hand pulling with cut and dab herbicide treatments. When feasible, the root system is generally shallow and plants can be uprooted easily. Persistent root re sprouting may require repeat cutting with herbicide application over several seasons to fully control.

*Lonicera morrowii,*
Morrow's Honeysuckle

**Buckthorn**

***Description:***
*Frangula alnus*, Glossy Buckthorn is a deciduous shrub that grows up to 20 ft.. tall. The oblong leaves are up to 2" long, arranged alternately along the stem and are dark green on the surface, glossy above and slightly pubescent beneath. The leaves turn yellow in the fall, and remain on the plant when most other species have already lost their leaves. The yellow-green flowers are arranged in 1-8 flowered sessile, glabrous umbels. This plant flowers after the leaves expand, from May to September . The fruit ripen from red to black July to August.

***Habitat:***
Buckthorn thrives in early successional habitat. Abandoned agricultural or pasture lands, an opening in canopy within woodland, or unmanaged meadows are common areas. Buckthorn will also tolerate wetland soils where it can form dense stands that suppress the growth of native plant species. The seed is readily dispersed by birds, and the extended productivity of the fruit into winter allows the plant to be dispersed through the entire season.

***Management:***
Manual methods of hand-pulling seedlings is recommended. For larger saplings, a 'Weed Wrench' is effective. Mature Buckthorn can also be cut and the stump application of Triclopyr based herbicide. Rake any seeds present, bagging and disposing of correctly.

*Frangula alnus,*
Glossy buckthorn

**Multiflora Rose**

***Description:***
*Rosa multiflora*, Multiflora Rose is a shrub with arching canes with a mounding shape in the landscape. The leaves are divided into five to eleven sharply toothed leaflets. The base of each leaf stalk has a pair of fringed bracts which is a key identifier of the plant from other wild rose. Beginning in early summer, clusters of showy white flowers appear. The flowers are followed by developing red fruit, or hips, during the summer that remain on the plant through the winter.

***Habitat:***
Multiflora Rose thrives in early successional habitat. The rose has a wide tolerance for various soil, moisture, and light conditions. It occurs in dense woods, along river banks and roadsides and in open unmanaged fields. It can form a dense understory that suppresses growth of native plant species. The seed is readily dispersed by birds, and the extended productivity of the fruit into winter months allows wide spread distribution of the plant.

***Management:***
Manual methods of hand-pulling seedlings is effective. For more established shrubs, a combination of pruning to reduce mass followed by cut & dab treatments with a Triclopyr based herbicide is recommended. Persistent root infestations may require repeat cutting over several seasons. Rake any seeds present, bagging and disposing of correctly.

*Rosa multiflora,*
Multiflora rose

**Description:**
Japanese Barberry makes a dense, deciduous shrub understory that grows to 8 feet. Branches are brown, deeply grooved, zigzag in form and bear a single sharp spine at each node. The leaves are small (½ to 1 ½ inches long), oval shaped, green, bluish-green, or dark reddish purple. Flowering occurs from mid-April to May in the northeast. Pale yellow flowers about ¼ in. Across hang in umbrella-shaped clusters of 2-4 flowers along the length of the stem. The fruits are bright red berries about 1/3" long that are borne on narrow stalks. They mature during late summer and fall and

**Habitat:**
Japanese Barberry is shade tolerant, drought resistant, and adaptable to a variety of open and forested habitats, and disturbed areas. It prefers to grow in full sun, but will flower and fruit even in heavy shade. There is also strong research to support the surprise benefit of controlling Japanese Barberry in the reduction of black legged (or deer) tick populations.

**Management:**
Japanese Barberry is a prolific seed-producer with a high germination rate, so prevention of seed production should be a management priority. Barberry also spreads by rhizome, so underground root fragments should be removed. Manual methods of hand pulling sprouts works well in small populations, but large populations may require chemical applications by applying a 2% solution of glyphosate

*Berberis thunbergii,*
Japanese Barberry

# IDENTIFICATION AND QUALIFICATION OF APPLICANT

This plan has been developed by Miles H. Connors, Director of Ecological Services at Parterre Ecological, a division of Parterre Garden Services. Parterre Ecological Services provides Land Management Planning, expert Invasive Plant Management services, Native Plant Restoration strategies, and ongoing Maintenance and Monitoring in natural area restorations.

## PLAN AUTHOR AND QUALIFICATIONS

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Miles holds an Bachelor of Science degree in Environmental Planning and Policy and Biology, with a Masters of Science in Sustainable Landscape Planning and Design. Miles is also a Massachusetts Certified Horticulturist, holds an Invasive Plant Certification from UMASS Amherst and is a Licensed Pesticide Applicator.

Members of the Parterre Ecological team are licensed Massachusetts Pesticide Applicators, are Massachusetts Certified Horticulturists and hold an Invasive Plant Certification from UMASS Amherst.

Precedent Images of a Restoration Project completed in 2020

1. Existing Conditions - Client under an enforcement order to restore buffer after tree & shrub removal and hydroseeding turf

2. After installation of sediment control, we mechanically mowed area and seeded with New England Conservation and Wildlife Seed Mix

3. Covered exposed loam with straw erosion control blanket: BioNet S75BN and staple into existing slope

4. Layout native plant species suitable for an Oak Hickory Forest plant community

5. Native plant species installed: *Quercus rubra, Kalmia latifolia, Ostrya virginiana, Corylus americana, Betula lenta, Fagus grandiflora and Viburnum acerfolium*