

ATTACHMENT C

Invasive Control Methodologies and Native Replanting Plan

Invasive Control Methodologies

GENERAL NOTES

Disposal: All cut vegetation will be removed from the site. Vegetative and vine material will be transported to the City's invasive vegetation dumpster for proper disposal. Norway maple wood will be chipped off-site.

Multi-year control: Control of these aggressive invasive species will require multiple years of management and repeated treatment. Quickly establishing native vegetation in treated areas will help discourage the re-establishment of invasive species.

SPECIES-SPECIFIC METHODOLOGIES

Norway Maple (*Acer platanoides*)

Description: Norway maple is a large deciduous tree that can grow up to approximately 40-60 feet in height. This species tends to leaf out earlier in the spring than other maples. During the summer, fruits mature into helicopter-like blades (samaras) with wide-spreading wings. Norway maple forms monotypic populations by displacing native trees, shrubs, and herbaceous understory plants. Once established, it creates a canopy of dense shade that prevents regeneration of native seedlings. The shallow root system makes growing difficult for other native shrubs and wildflowers in the understory. Other species of flora and fauna, such as insects and birds, may indirectly be affected due to the change in resource diversity and availability.

Management: Physical removal can be an effective option for Norway maple. Larger trees can be cut. Cut-stump treatment with triclopyr (typically at concentrations of 20-100%, mixed with water) immediately after cutting will yield the most effective results.

Glossy Buckthorn (*Frangula alnus*), Multiflora Rose (*Rosa multiflora*), Autumn Olive (*Elaeagnus umbellata*)

Description:

- European buckthorn is a shrub or small tree that can grow to 22 feet in height and have a trunk up to 10 inches wide. Exotic buckthorns tend to form dense, even-aged thickets, crowding and shading out native shrubs and herbs, often completely obliterating them. Dense buckthorn seedlings prevent native tree and shrub regeneration. Buckthorn often establishes beneath trees at the edges of forests and fields.
- Multiflora rose is a large, thorny perennial shrub that can reach over 10 feet in height. Multiflora rose is a thorny, perennial shrub with arching stems (canes), and leaves divided into five to eleven sharply toothed leaflets. The base of each leaf stalk bears a pair of fringed bracts. Beginning in May

or June, clusters of showy, fragrant, white to pink flowers appear, each about an inch across. Small bright red fruits, or rose hips, develop during the summer, becoming leathery, and remain on the plant through the winter.

- Autumn olive is a medium to large deciduous shrub, which can grow rapidly, often in multi-stemmed form, and can reach heights of up to 20 feet and a spread of 30 feet wide. Its leaves are grayish-green in color with a silvery underside. Autumn olive flowers in the spring with numerous small, pale yellow, trumpet-shaped flowers that are very fragrant. The fruits are small, round, fleshy, reddish to pink with silvery speckles. Autumn olive stems are ashy brown, but silvery scales are especially prominent on young stems, which sometimes appear totally gray. The stems also bear sharp, stout spines.

Management: Treatment through the repetitive use of herbicides has proven to be an effective control method for managing invasive shrubs. These species are susceptible to both glyphosate and triclopyr. The chosen herbicide will depend on the time of treatment. Triclopyr is best applied in spring before or during flowering. Glyphosate is most effective when applied later in the growing season (late summer to early fall). Cut-stem treatment is effective late in the growing season (July through September). Cut stems will be treated with glyphosate or triclopyr formulations applied as directed by the label of the specific product used (typically at concentrations of 20-100%, mixed with water)

Asiatic Bittersweet (*Celastrus orbiculatus*) and Climbing Spindle-tree (*Euonymus fortunei*)

Descriptions:

- Asian bittersweet is a perennial vine occurring in both uplands and wetlands that was introduced to the U.S. in the mid-1800s. This vine often reaches 60 feet in height, and stems may reach four to five inches in diameter. Mature fruits have a dark yellow-orange outer skin that peels back to reveal orange-red, fleshy fruits. This non-native species produces abundant seeds. The stems of this non-native woody vine wrap around and girdle trees, shrubs, and other woody vines or may cause physical damage from the immense weight of its rapidly growing shoots. Oriental bittersweet may also spread laterally along the ground, forming an impenetrable tangled mass that smothers out all other vegetation.
- Climbing spindle-tree is a non-native species with orange fruits that can be dispersed by birds. It has two forms that have been collected in the region: a liana that climbs on other vegetation by means of aerial roots and an upright or spreading shrub that does not climb. First introduced to the United States in 1906 as an ornamental, many variegated cultivars are available. While it has been found naturalized in New England away from the cultivated setting, most populations appear to be planted individuals that have persisted after or spread from cultivation.

Management: Cut-stem is the preferred approach for management of Asiatic bittersweet. The stems will be cut to approximately two inches above the ground, and then the cut surface will be immediately painted with concentrated triclopyr formulations (typically at concentrations of 20-100%, mixed with water) will be applied as directed by the label of the specific product used. Note that cut-stem applications are more prone to resprouts and may require follow-up treatments for full control. Triclopyr specifically targets broadleaf plants, reducing the chances of impacting nearby monocots. Cut

material should be left in place to degrade naturally, providing a long-term carbon source for the ecosystem.

Garlic mustard (*Alliaria petiolata*)

Description: Garlic mustard is a cool season biennial herb with stalked, triangular to heart-shaped, coarsely toothed leaves that give off an odor of garlic when crushed. First-year plants appear as a rosette of green leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. Flowering plants of garlic mustard reach from 2 to 3-½ feet in height and produce buttonlike clusters of small white flowers, each with four petals in the shape of a cross. \

Physical/Mechanical Control

Removal via hand pulling of plants is possible for light infestations and when desirable native species co-occur. Care must be taken to remove the plant with its entire root system because new plants can sprout from root fragments. This is best achieved when the soil is moist, by grasping low and firmly on the plant and tugging gently until the main root loosens from the soil and the entire plant pulls out. Pulled plants should be removed from the site, if at all possible, especially if flowers are present.

For larger infestations of garlic mustard, or when hand-pulling is not practical, flowering stems can be cut at ground level or within several inches of the ground, to prevent seed production. If stems are cut too high, the plant may produce additional flowers at leaf axils. Once seedpods are present, but before the seeds have matured or scattered, the stalks can be clipped, bagged, and removed from the site to help prevent continued buildup of seed stores. This can be done through much of the summer. Chemical control is not recommended for this site.

Native Replanting Plan

GENERAL NOTES

There will be an effort to create clusters of trees and shrubs to create wildlife habitat areas and to facilitate the on-going control of invasives. There will be an effort to minimize disturbance of the roots of existing native trees and shrubs that are due to be protected. Given the proximity to the wetland, watering is not likely to be necessary, but will be undertaken as needed for the first few months.

Native trees: native trees will be planted, by hand, in open areas appropriately located away from the mature native trees that are to be preserved and appropriately spaced from one another, according to the planting schedule. Leaf litter mulch will be placed around the bases of the trees (but not mounded over the trunks) to retain moisture and limit weed growth.

Native shrubs: native shrubs will be planted, by hand, in open areas appropriately located away from the mature native trees that are to be preserved and appropriately spaced from one another, according to the planting schedule. Leaf litter mulch will be placed around the bases of the shrubs (but not mounded over the trunks) to retain moisture and limit weed growth.

Native seed mixes: After the trees and shrubs have been installed, a combination of two native seed mixes (wetland and upland), both including woody shrub seeds as well as vegetative species, will be broadcast over the non-mulched areas and lightly raked to ensure good contact with the ground. Suggested seed mixes are attached; acceptable equivalent seed mixes, if substituted, should be approved by the Conservation Commission.

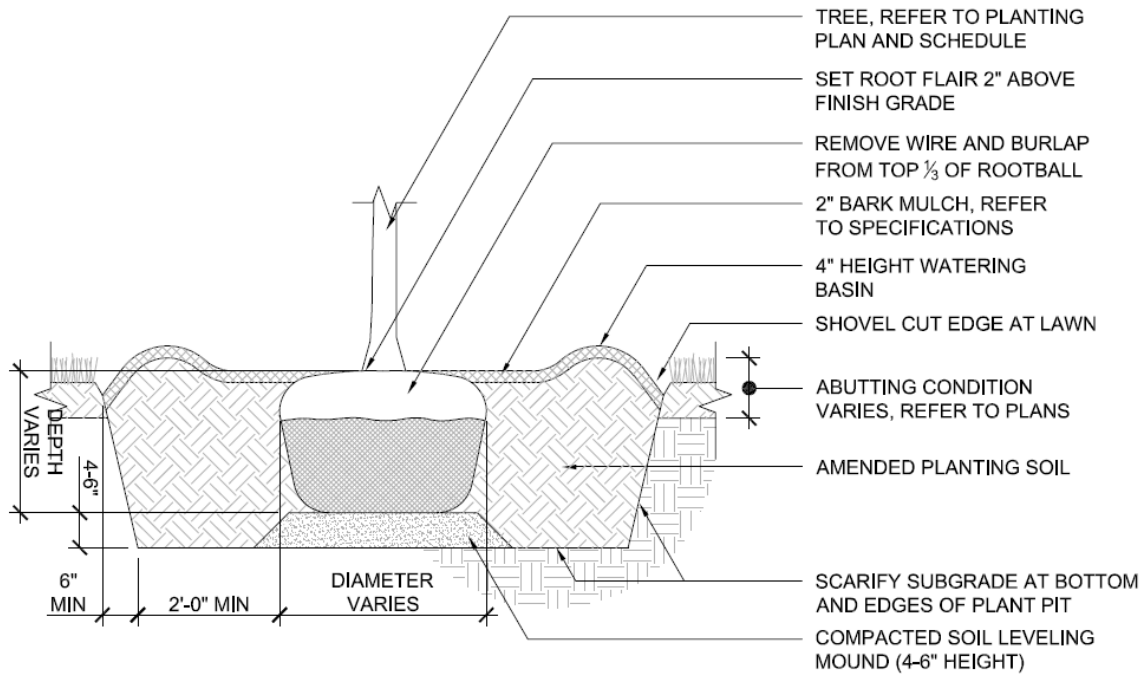
PROPOSED RESTORATION PLANTINGS

TREES			
<u>Quantity</u>	<u>Botanical Name</u>	<u>Common Name</u>	<u>size</u>
5	<i>Acer rubrum</i>	Red Maple	1.5" - 2" caliper
2	<i>Betula nigra</i>	River Birch	4' - 6' clump
3	<i>Nyssa sylvatica</i>	Black Gum	1.5" - 2" caliper
4	<i>Quercus bicolor</i>	Swamp Oak	1.5" - 2" caliper
SHRUBS			
<u>Quantity</u>	<u>Botanical Name</u>	<u>Common Name</u>	<u>size</u>
7	<i>Clethra alnifolia</i>	Sweet Pepper Bush	18" - 2' #2 container
7	<i>Cornus amomum</i>	Silky Dogwood	2' - 3' #2 container
7	<i>Ilex verticillata</i>	Winterberry	2' - 3' #2 container
2	<i>Salix discolor</i>	Pussy Willow	2'-4' #3 container
7	<i>Viburnum acerifolium</i>	Maple Leaf Viburnum	15" -18" #3 container

The entire swath will be planted with a combination of native seed mixes with species designed to withstand both wetland and upland conditions, to retard regrowth of invasives and enhance species diversity within the buffer zone and , the City will spread a combination of seed mixes:

- New England Roadside Matrix Upland Seed Mix; and
- New England Roadside Matrix Wet Meadow Seed Mix.

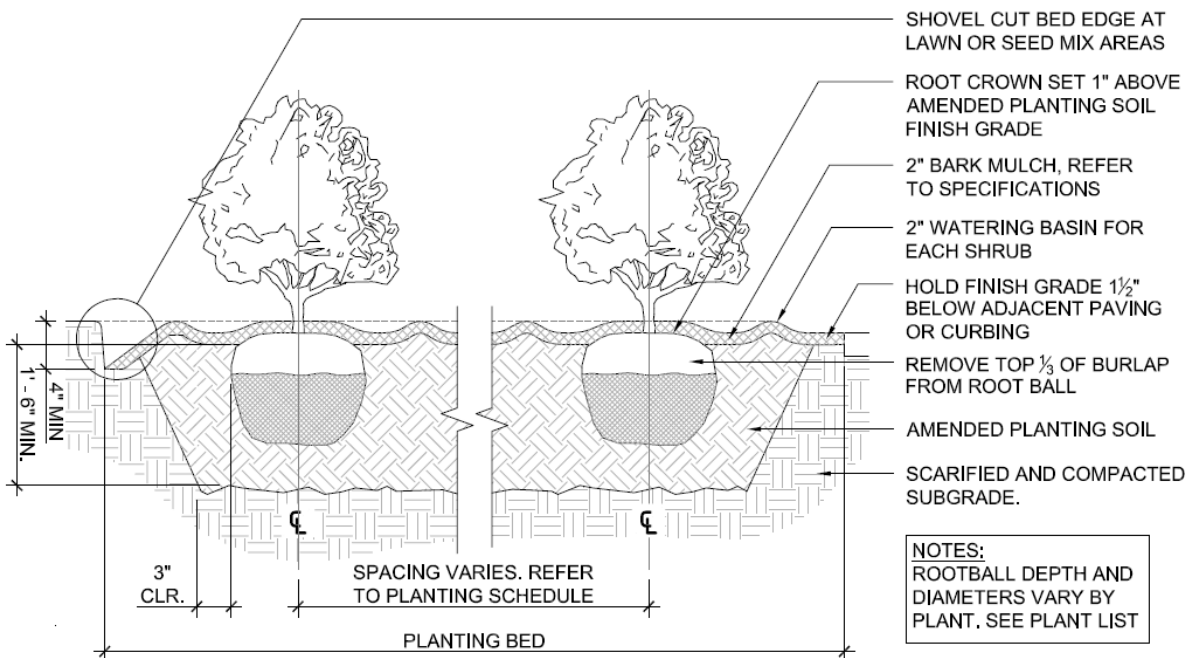
TREE PLANTING DETAIL



NOTES:

1. TREES TO BE STAKED AS NECESSARY. REVIEW WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

SHRUB PLANTING DETAIL



NOTES:

1. ROOTBALL DEPTH AND DIAMETERS VARY BY PLANT. SEE PLANT LIST