



**US Army Corps  
of Engineers**®  
New England District

## **Invasive Species Control/Management Plan (ISCP) Guidance**

This document provides an outline for developing Invasive Species Control/Management Plans (ISCPs) and ISCP examples<sup>1</sup>. These ISCPs are generally required for all inland fill projects reviewed in the Individual Permit review category and for some inland fill projects reviewed under the Corps state general permits. Note that all applications for inland fill projects in Massachusetts must include an ISCP as stated in General Condition 27 of the Massachusetts General Permit.

For Individual Permits, a Compensatory Wetland Mitigation Plan is generally required and the ISCP is typically part of that plan. In the context of a Compensatory Wetland Mitigation Plan<sup>2</sup>, the goal of Invasive Species Control/Management is to slow the spread of invasive plant populations which might prevent successful mitigation of impacts to wetlands.

The level of effort and detail associated with drafting ISCPs should be commensurate with the impacts and risks associated with your project.

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<sup>1</sup> Examples are for the public's information to assist with drafting ISCPs. Inclusion of these examples does not imply endorsement by the Corps.

<sup>2</sup> See [www.nae.usace.army.mil/reg](http://www.nae.usace.army.mil/reg) and then "Mitigation" to view the Corps "Mitigation Plan Checklist" and "Mitigation Plan Checklist Guidance."

## Outline for Developing an Invasive Species Control/Management Plan (ISCP)

The following items might be addressed when developing in an ISCP:

1. Identify the risks posed by invasive species:
  - a. Within the project area
  - b. From nearby adjacent properties
  - c. From the watershed and region
2. Describe existing conditions within the Project Area:
  - a. Baseline inventory of invasive species
  - b. Relative abundance of invasive species
  - c. Baseline map showing extent of the invasive species
3. Identify target species
4. Identify the control or management options for each target species:
  - a. Biological
  - b. Mechanical
  - c. Chemical
5. Identify the preferred control or management strategy for each target species:
  - a. Summarize the techniques
  - b. Identify any constraints (e.g. regulatory or site conditions that impact practicable solutions)
  - c. Schedule of control activities
  - d. Required Resources
    - i. Personnel qualifications
    - ii. Equipment
    - iii. Sanitation/re-contamination considerations
  - e. Monitoring
    - i. Inventory invasive species in the project area
    - ii. Using baseline map compare species abundance with baseline condition
    - iii. Reassess/evaluate effectiveness of management strategy
    - iv. Refine management strategies as needed.
  - f. Total anticipated cost.
6. Resources:
  - a. U.S. Army Corps of Engineers, New England District website:  
[www.nae.usace.army.mil/reg](http://www.nae.usace.army.mil/reg), under the heading, "Invasive Species."
  - b. Invasive Plant Atlas of New England  
[www.ipane.org](http://www.ipane.org)
  - c. Cooperative Extension System Offices  
[www.csrees.usda.gov/Extension](http://www.csrees.usda.gov/Extension)

Example 1: low level of effort and detail  
PENDING

# Middlesex Turnpike Improvement Project Invasive Plant Species Control Plan

Construction of the Middlesex Turnpike Improvement Project will create opportunity for noxious weeds or invasive plants to become established. In particular, the wetland replacement area, restoration wetlands and the stormwater management basins and water quality swales may create opportunity for invasive plant species to invade and become established and out compete desirable native plant species. This plan provides the methods and procedures for control and removal of invasive plant species growth during construction of the project.

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## Introduction

The Middlesex Turnpike Improvement Phase II Project will alter approximately 14,826 square feet of Bordering Vegetated Wetland that will be mitigated within an approximately 62,744-square foot wetland replacement area. In addition, approximately 22,286 square feet of wetland will be temporarily altered by construction activities. The Project will also include construction of 4 detention basins and several water quality swales. Construction of the replacement area, restoration of temporarily altered wetlands and the stormwater management facilities will be restored by seeding and planting with native plant species. However, the replacement and restoration areas and stormwater facilities will also provide suitable growing conditions for invasive species that can be aggressive and persistent. Typically in New England there are a number of plant species brought here from other countries that have become noxious by out competing native species. These plants often do not have any natural control measures such as insects, diseases or wildlife that feed on the plants to hold them in check. Invasive species include purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), Japanese knotweed (*Polygonum cuspidatum* or *Fallopia Japonica*), Japanese stiltgrass (*Microstegium vimineum*), Reed Canary grass (*Phalaris arundinacea*), bittersweet (*Celastrus orbiculatus*), black swallow-wort (*Cynanchum nigrum*), European swallow-wort (*C. rossicum*), European buckthorn (*Rhamnus frangula*), honeysuckle (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*) and burning bush (*Euonymus alatus*). These species can be a significant problem if they become established within wetland mitigation areas or stormwater facilities. These species produce many seeds, grow quickly and can overwhelm mitigation areas and exclude the growth of more desirable native species. The mitigation program for Middlesex

Turnpike includes measures to identify and address the growth of invasive species within the project limits.

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## Monitoring

Monitoring of the wetland replacement area, areas of temporarily altered wetlands and stormwater management facilities will be needed to identify if invasive species are becoming established and if measures are warranted to address the problem. Monitoring will be conducted during construction and post construction of the wetland replacement, restoration areas and the stormwater management facilities by the Environmental Monitor (EM) and Wetland Scientist (WS). Monitoring of the project area will be in the spring and fall of each year during construction to assess the presence of invasive species. A fact sheet that includes photographs and descriptions of each species will be prepared for use by the EM and WS to assist in identification of invasive species. Estimates of the percent cover of invasive species will be based on qualitatively ocular estimates and reported to the contractor and regulatory agencies as part of the regularly scheduled monitoring reports. If invasive species are observed, they will be addressed in accordance with the following management procedures.

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## Invasive Species Management

Invasive plant species most likely to be a problem in the constructed wetland areas or in stormwater facilities will include purple loosestrife, common reed and European buckthorn. Each species will be addressed according to methods most likely to be effective in control of the species. Invasive species are broadly grouped as herbaceous and woody. Each will be address in accordance with the most effective methods.

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### Herbaceous Invasive species

Herbaceous invasive plant species include: purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), and Reed Canary grass (*Phalaris arundinacea*), which are common wetland species in Massachusetts and may present the greatest challenge in the wetland replacement area or a detention basin. In addition, garlic mustard (*Alliaria petiolata*), Japanese knotweed (*Polygonum cuspidatum* or *Fallopia Japonica*), Japanese stiltgrass or Nepalese browntop (*Microstegium vimineum*) black swallow-wort (*Cynanchum nigrum*), and European swallow-wort (*C. rossicum*) are not typically found in wetlands, but are often found in close proximity to wetlands and where soils have been disturbed. The following management control measures will be used for herbaceous plant species.

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## Purple loosestrife (*Lythrum salicaria*)

An herbaceous species, purple loosestrife is a wetland indicator species and often found in natural and man-made wetlands. This species can be effectively controlled by several methods. Typical control measures include hand pulling, herbicide treatment or biological control (*Galerucella* spp. beetles). Purple loosestrife is shade intolerant and once the planted shrub and forested species provide a canopy that shades the replacement or restoration areas, purple loosestrife should not be a concern. If loosestrife becomes established in the stormwater management facilities, control may be more of an issue since the stormwater management are typically managed to eliminate woody vegetation.

Young plants can be pulled up by hand or dug up if the plant is not too big and the infestation is not too widespread. Hand pulling can be time consuming and costly and requires a basic understanding of plant taxonomy to ensure the proper plant is being pulled up particularly if the plants are very young. Digging or hand pulling of larger plants, say greater than 18 inches tall, becomes ineffective since the large fibrous root system makes it unlikely the plant can be pulled up or that all of the plant will be removed. Vegetation that is pulled up by hand also needs to be managed properly. Allowing the plant material to dry out and die before disposal is best to ensure the removed plants are unable to re-root elsewhere. Placing the removed plants in sealed black plastic bags and left in the sun for several weeks should ensure the plants are killed before disposal.

Once the plants get larger than 18 inches in height, or the density of plants is excessive, herbicide treatment with Glyphosate (Rodeo®) is more effective to control loosestrife. Herbicide can be sprayed or applied by wick application. Glyphosate is a non-specific herbicide and the foliage of any plant sprayed will be killed. Therefore, spraying may not be suitable as the desirable seeded or planted plants will also be impacted by the herbicide application.

Two other glyphosate formulations have been approved for wetland use: Accord Concentrate and Glyphomate 41. The table below provides a comparison. Glyphosate has been found to be non-toxic to aquatic organisms, and numerous studies on the use of Rodeo in wetlands has found no adverse effect on aquatic biota. The product does not accumulate in food chains, is non-volatile, and immobilized in soils, and is rapidly removed from the environment by chemical bonding with soil particles and microbial degradation.

### Glyphosate Herbicide Comparison

Herbicide	Glyphosate Concentration	Surfactant
Rodeo	53.8%	Must use with non-ionic surfactant
Glyphomate 41	41%	Surfactant included in formulation
Accord Concentrate	53.8%	Must use with non-ionic surfactant

Rodeo, has been widely and successfully used to control loosestrife in similar habitats in New England. Rodeo would be applied using a backpack sprayer at a concentration of 5%, will be sprayed onto the target foliage during the August 15-September 15 time period in two successive years. A dye will be added to the glyphosate so that treatment can be monitored. This also minimizes over spraying and damage to adjacent non-target plants. Rodeo and Accord require that a non-ionic surfactant be used, such as Cidekick™, which is used by MassAudubon.

Wick application could also be conducted using a foam applicator saturated with glyphosate which allows a targeted application with less risk of impact to desirable plants. Similar to hand pulling or digging, wick application will be labor intensive and may not be suitable for a widespread and dense infestation. Any herbicide application would have to be conducted by a Massachusetts licensed herbicide applicator.

Biological control may provide the best opportunity for long term treatment of an extensive infestation of purple loosestrife. Control would be achieved by the release of two leaf-feeding species of *Galerucella* spp. beetles (*G. pusilla* and *G. californiensis*). Adults and larvae of these species prefer purple loosestrife as a food source feeding on the leaves, significantly weakening the plants and can cause a reduction in purple loosestrife density of up to 90 percent. Use of these beetles has been shown to be effective in controlling purple loosestrife in other locations in Massachusetts. The Massachusetts Office of Coastal Zone Management (MCZM), Wetlands Restoration Program (WRP) is managing the Purple Loosestrife Biocontrol Project for Massachusetts. Any program to release beetles would have to be coordinated with the WRP and typically requires releases over three years with monitoring.

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### Common reed (*Phragmites australis*)

Common reed is a very aggressive grass with an extensive rhizomose root system that if becomes established can be extremely difficult to eliminate. Many control measures have been tried in the past including mowing, flooding, burning, and covering with black plastic but the most effective control method has been herbicide application. Glyphosate has been shown to be an effective control measure but usually takes two or three seasons of applications to eliminate dense stands. Similar to purple loosestrife, common reed is shade intolerant and once the planted shrub and forested species provide a canopy that shades the replacement or restoration areas, common reed should not be a concern. If common reed becomes established in stormwater management facilities, periodic mowing may provide some control, but will likely not eliminate the plants. Other measures will likely be needed for long term control.

Hand pulling or digging may be effective on small or very young plants. This will be very labor intensive particularly if the plant becomes well established. However,

once a stand becomes established, the extensive root system will make hand pulling or digging very difficult and potentially ineffective.

The most effective means of control of common reed has been application of herbicides such as glyphosate. Similar as discussed for purple loosestrife, herbicide application can be sprayed or applied by a wicking device. Control of dense stands of common reed would likely require multiple applications over several years. Any herbicide application would have to be conducted by a Massachusetts licensed herbicide applicator.

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### Reed Canary grass (*Phalaris arundinacea*),

Reed canary grass is an aggressive wetland species that forms dense monotypic stands to the exclusion of other wetland species. It spreads by rhizomous growth and seeds. Once established it can be difficult to adequately control due to resprouting from the soil seed bank. However, this herbaceous species should not be a problem once the shade canopy of the tree and shrub species become established in the replacement wetland area. This may be a continuing problem in stormwater management facilities where woody growth is discouraged.

Several methods of control are available each with moderate effectiveness. No one methodology will be fully effective if the reed canary grass is well established. Control methods include, herbicides, burning, mowing or mechanical removal.

Use of glyphosate has shown to have some success, being effective for up to two years. After two years, regrowth from the seed bank may reestablish the stand. Spraying large stands and or wicking small stands or individual plants will provide the best options. Repeated application will likely be needed.

Burning and twice yearly mowing have also shown some success, but again resprouting from the seed bank will require management over multiple years. Removal using heavy construction equipment has not shown to be effective due to rapid regrowth from rhizomes and seeds left in the soil.

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### Garlic mustard (*Alliaria petiolata*)

Garlic mustard is a biannual plant that can form dense monotypic stands in to the exclusion of native species. This plant grows in dense shade and can become established as a ground cover under forest canopy. It is not a wetland plant therefore will likely not be a problem in the wetland replacement area but may become an issue elsewhere along the project corridor. Hand pulling and herbicides are the best management methodologies.



Small infestations of garlic mustard can be controlled by hand pulling second year plants when they have started to flower. All the root must be removed since the roots can resprout. Collected plants should be placed in plastic bags and landfilled and not left on the ground or composted as they may remain alive and may yet produce seed.

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### Japanese knotweed (*Polygonum cuspidatum* or *Fallopia Japonica*)

Japanese knotweed is an aggressive perennial plant that sprouts from an extensive root and rhizome system. Roots can extend 20 feet from the plant and down 7 feet into the soil. Vegetative reproduction is likely the reason it is so successful at creating dense stands. Mechanical control means may be used, but any roots left in the soil will resprout. Herbicide applications will likely be required to control this species if it becomes established.

Hand pulling can be used on individual plants. This can be done when individual plants area small, and must be repeated often during the growing season. When observed, plants should be pulled and bagged for disposal in a land fill. Do not leave on the ground as stems and stem fragments can root. Cutting can be effective on small patches, but requires repeated events. Stems must be cut twice a month from April to August and then once a month until frost. Cutting will stimulate growth and tends to produce numerous small shoots. Repeated cutting when the plants are small, six inches or less, deprives the plants of energy. When cut all fragments must be collected and bagged for disposal.

Herbicides can be used as a foliar application or injected into the plant stems. Foliar applications should be conducted in July to September, from flower bud to seeding stage. Foliar applications include risk of drift of herbicide to non-target species. Herbicides suitable for knotweed include, glyphosate, imazapyr, and triclopyr. Stem injection of concentrated herbicide is highly effective. Up to 95 percent or more of the plants can be controlled in the first year. Benefits are that it reduces drift and impacts to non-target species. This is time and labor intensive for large stands. Every plant stem (cane) must be injected. Only stems over ½ inch can be injected, so there will be some smaller canes that will not be treated. Multiple years of treatment will be needed to full eradicate the stand. In addition, the amount of herbicide that can be applied per acre is limited, typically 2 gallons per (2500 stems) per acre.

Herbicide application can be used in connection with mechanical methods (cutting and pulling) to reduce the amount of herbicide applied. Any herbicide application must be conducted by a Massachusetts licensed applicator.

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## Japanese stiltgrass (*Microstegium vimineum*)

Japanese stiltgrass is an annual grass that grows with a sprawling form. This grass is adapted to low light over a wide range of moist to dry conditions. Stiltgrass forms dense patches reaching heights of 2 to 3.5 feet and displaces native species and readily invades disturbed areas.

Stiltgrass can be pulled by hand at any time, but preferably prior to going to seed. As an annual grass, several years of pulling may be needed to exhaust the seed bank in the soil. Stiltgrass can also be cut with a mower or “weed whacker”. Cutting should be done late in the season to avoid regrowth. Cutting should be done before flowering and seeding to prevent seed production. Cutting too early in the summer will stimulate regrowth and flowering earlier than normal. A second cutting would be needed to prevent seed production.

Use of herbicide glyphosate is practical and effective against stiltgrass. Foliar applications at any time will be effective, but with any spray application, caution must be used to avoid non-target species.

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## black swallow-wort (*Cynanchum nigrum*) and European swallow-wort (*C. rossicum*)

Swallow-worts grow rapidly, overgrowing native species and leading to displacement by overcrowding. The stems can reach 5 to 6.5 feet in length and form branched and twining habit. The plants flower June to September and form pairs of slender pods similar to milkweed pods. Seeds are dispersed by the wind allowing the seeds to be spread over a large area. Stems will resprout aggressively when cut and pulling is difficult because of the fibrous root system.

Pulling plants often leads to resprouting but can be used to prevent seed production. Plants will need to be pulled twice during the growing season. Digging is effective, but the entire crown must be removed and disposed of properly. Pod picking can be used to prevent seed production however, repeat visits to pick pods will be needed. Pods that are collected should be burned to destroy the seeds. Burning of the plants is not effective. Chemical control using Garlon 4 (Triclopyr) or RoundupPro (glyphosate) has been effective. Repeated application will be needed for dense stands. Application should precede seed production. Application to cut stems can also be effective for small infestations or if nearby desirable vegetation may be impacted.

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## Woody Plant Invasives

Woody invasive plants in wetlands area generally limited to European buckthorn (*Rhamnus frangula*), honeysuckle (*Lonicera* spp.), Asiatic bittersweet (*Celastrus orbiculatus*), Japanese barberry (*Berberis thunbergii*), and burning bush (*Euonymus*

*alatus*). These species are commonly encountered in the woods and wetlands where the seeds have been dispersed by birds.

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### European buckthorn (*Rhamnus frangula*)

European buckthorn is a woody shrub that has become well established in New England in forested wetlands. Unlike purple loosestrife and common reed, buckthorn is an understory shrub and will survive in shade. Buckthorn produces a large number of small berries with a single seed. The berries are readily eaten by birds in the fall and the seeds widely distributed. The best management technique is not to allow it to get established. Buckthorn is present along the wooded Bank of the Vine Brook Tributary, adjacent to the proposed Wetland Replacement Area.

Small plants and seedlings can be easily pulled by hand. Pulled plants should be allowed to dry out and die before disposal. Hand pulling is labor intensive and given the prodigious seed production, may not be feasible as an effective management technique. Removal of large plants may also be accomplished by digging or use of a hand operated mechanical plant puller.

Herbicide treatment of a shrub species can be accomplished by spraying or cutting and painting the stump with glyphosate or triclopyr.

Spraying of a shrub using a non-specific herbicide such as glyphosate requires application to leaf surfaces. Leaves take up the herbicide and it is translocated within the plant to the root system where the plant is killed. Spraying glyphosate on the trunk of a woody plant will have no effect on the plant. Spraying the leaf canopy of a shrub will likely result in significant overspray, impacting nearby plants as well as the targeted plant. This method of herbicide application should be used very sparingly if at all due to the potential to impact adjacent non-target plants.

Larger plants can be killed by cutting the shrub and painting the stump with a concentrated solution (20 percent) of glyphosate. Applying the herbicide directly to the cut stump using a foam paint brush will introduce the herbicide to the plant's root system and kill the plant. This method is a targeted application and avoids the need to spray and the associated overspray damage to desirable plants. Cutting and painting are labor intensive but avoids unintended damage to desirable plants. Cutting and stump painting may need to be conducted over several seasons to fully eliminate large specimens.

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### Honeysuckle (*Lonicera* spp.)

Bush honeysuckles when established, exclude all other ground covers and shrubs. Honeysuckle produces fruits that are eaten by birds and disperse the seeds. They

have a wide range of tolerance from partial to full sun. They are extremely invasive and can easily dominate a habitat.

Removal of small plants can be accomplished by pulling the seedlings and allow to desiccate. This will likely be the preferred control method, as any honeysuckle plants observed in the replacement area or stormwater management system should be small. Large shrubs should not be pulled. Control of large shrubs will require a combination of mechanical cutting and herbicide treatment of the stump. Shrubs should be cut with loppers, hand saw or chainsaw. A smooth flat cut of the stem should be left. Each stump should then be treated with a dyed 20 percent solution of glyphosate. Cutting and treatment can be done any time of year. Cutting and herbicide treatment to the stump is very effective and the stumps should not resprout. However, cutting should not be done unless herbicide is also used. Cutting without herbicide will only result in dense resprouting. Reseeding the area after removal of the honeysuckle will help to reestablish a native herbaceous community.

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### Asiatic bittersweet (*Celastrus orbiculatus*)

Asiatic bittersweet is a spreading deciduous vine that overcomes trees and shrubs and shades out native vegetation. The twining vine twists around stems and trunks and can strangle trees and shrubs. Tree canopies weighted down with the vine become more susceptible to wind, snow and ice damage.

The best control method is to prevent establishment by monitoring and pulling small plants. This will likely be the best control method for this project. Small plants will be easily pulled before getting too large. Larger plants can be controlled by cutting the vines and immediately treating the stump with herbicide. Herbicides that could be used include triclopyr or glyphosate. Cutting without herbicide treatment will stimulate regrowth and should not be done. Large patches of bittersweet can be treated with a foliar application of herbicide, however, this will also kill any shrubs or trees the vines are growing over.

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### Japanese barberry (*Berberis thunbergii*)

Japanese barberry is a small, compact deciduous shrub with small leaves and spines. Commonly grows to 2 to 3 feet in height, with shallow but tough roots. The shrub produces small red berries eaten by a variety of wildlife which scatter the seeds. Branches also root readily when they touch the ground. Barberry can tolerate a wide variety of conditions including well-drained to wet soils and partial to full shade.

Removal of the plants by pulling or digging is recommended in early spring. This shrub leafs out early, making it easy to identify. Small plants can be pulled easily by hand. Cutting and treatment of the stump with an herbicide has been successful for

larger specimens. Foliar application of herbicide is also possible, however, spray drift and impact to nearby desirable species must be considered.

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### Burning bush (*Euonymus alatus*)

Burning bush was widely planted as an ornamental shrub because of its red fall color and winged stems. This species can form dense thickets displacing native woody and herbaceous species. Burning bush grows 5 to 10 feet high and produces red fruits eaten by birds that then disperse the seeds.

Control of burning bush can be accomplished by manually, mechanically and chemically. Seedlings and small plants can be pulled by hand. This will likely be the best management technique for this project. Shrubs can be cut, but must be done repeatedly to control resprouting. Cut stems can be treated with concentrated herbicide such as glyphosate or triclopyr. In addition, foliar application of herbicide may be used, but other desirable nearby plants may be impacted by overspray.

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### Control of Other Invasives

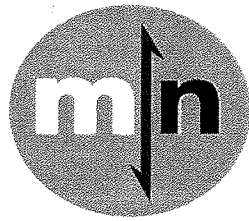
Other invasive plant species, not discussed here may become established in the wetland replacement, restoration areas and stormwater management facilities. If any invasive species are observed as part of the monitoring program for the mitigation areas or the stormwater management facilities, they will be addressed as appropriate.

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## Summary of Invasive Species Control

This Plan provides a number of potential management techniques for the most likely invasive species that will be encountered in this project. No single management technique may be adequate to address the problem. Construction monitoring will have to include review of the Wetland Replacement Area, Wetland Restoration Areas and the stormwater management facilities to assess the presence of invasive species. If the presence of invasive species is noted, a management plan will be prepared to address the problem and will likely require the use of several techniques. Action will be taken immediately when an invasive species is noted. Delay will only make the problem more difficult to address properly. Monitoring for invasive species will be conducted throughout the construction period as part of the regular construction environmental monitoring and will continue after completion of construction as part of the wetland mitigation area monitoring and normal yearly operations and management measures required for the stormwater management system. Results of invasive species monitoring and control measures will be reported as part of the yearly monitoring reports that will be required for the Wetland Replacement and Restoration Areas. Monitoring and management measures for invasive species will

also be part of the regular ongoing operations and management activities for the components of the stormwater management system.



middletown | norwalk

# WETLAND INVASIVE SPECIES CONTROL PLAN

*FOR THE*

## MIDDLETOWN-NORWALK 345-KV TRANSMISSION LINE PROJECT (OVERHEAD PORTION)

October 2006



**Connecticut  
Light & Power**

The Northeast Utilities System



*The United Illuminating Company*

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## *EXECUTIVE SUMMARY*

The Middletown-Norwalk 345-kV Transmission Line Project (“the Project”), which is being developed by The Connecticut Light and Power Company (“CL&P”) and The United Illuminating Company (“UI”; together “the Companies”), will extend for approximately 69 miles, primarily following existing rights-of-way (“ROWs”) through portions of Middlesex, New Haven, and Fairfield counties, Connecticut. Approximately 45 miles of the Project will consist of overhead transmission lines, located along or near CL&P’s existing overhead transmission line ROWs, whereas approximately 24 miles of the Project will be located underground, generally within or near urban road ROWs. Field investigations, conducted between 2002 and 2006, identified approximately 168 wetlands along the overhead portion of the Project.

This *Wetland Invasive Species Control Plan* (“the Plan”) addresses the anticipated procedures for managing invasive species in and enhancing the value of wetlands located within the overhead portion of the Project ROW. The *Plan* is designed to supplement CL&P’s existing upland and wetland ROW vegetation management program.

Although not all of the wetlands along the Project ROW will be directly affected by the construction of the new 345-kV transmission line, those areas that are disturbed could be subject to colonization by invasive species. Further, for those wetlands in which invasive species are already prevalent, construction disturbance could promote additional colonization or the spread of invasives to nearby wetlands.

Accordingly, this *Wetland Invasive Species Control Plan*:

- Lists the predominant undesirable invasive plant species that may occur in wetlands along the overhead portion of the ROW (Section 2);
- Presents a program for monitoring the status of invasive species in wetlands along the ROW, including forms to be used during field investigations (Section 4 and Appendix A);
- Identifies as a baseline the wetlands along the ROW in which such invasive species presently exist (Section 3 and Appendix B);
- Provides an approach for categorizing wetlands according to ecological integrity, wildlife habitat value (including amphibian breeding potential) and existing presence/absence of invasive species (Section 3 and Appendix B);
- Summarizes methods (e.g., mechanical, chemical treatment, biological, or combinations thereof) for controlling invasive species in wetlands along the ROW (Section 5); and
- Describes the anticipated schedule for initial monitoring/treatment (which will involve monitoring and control implementation the year following construction and annually for four years thereafter) and then for incorporating invasive wetland plant control strategies into CL&P’s existing integrated vegetation management program for ROWs.

As described in this *Plan*, the overall objective is to preserve and enhance the value of wetlands along the Project ROW, with a particular focus on those wetlands in which invasive species were not present prior to Project construction.

# 1. INTRODUCTION AND PURPOSE OF THE PLAN

## 1.1 Project Background and Need for Invasive Species Control

Invasive plants are non-native species that can successfully colonize and thrive beyond their natural ranges, often out-competing native plants. Characteristically, such species are highly adaptable and aggressive; have a high reproductive capacity; and have few natural enemies. The spread of non-native plant species in both wetland and upland areas of the northeastern United States is a concern for both biological reasons (e.g., the maintenance of endemic vegetation, the preservation of habitat for native wildlife species) and for cultural reasons (e.g., adverse aesthetic effects or nuisance impacts associated with the invasion of exotic species that out-compete native plants.)

The Middletown-Norwalk 345-kV Transmission Line Project (“the Project”), which is being developed by The Connecticut Light and Power Company (“CL&P”) and The United Illuminating Company (“UI”; together “the Companies”), will extend for approximately 69 miles, primarily along existing rights-of-way (“ROWs”) through portions of Middlesex, New Haven, and Fairfield counties, Connecticut. The Project will involve the installation of a new 345-kV transmission line and associated facilities, as well as the removal and reconsolidation of certain existing 115-kV lines on new structures within the same ROW.

Approximately 45 miles of the Project will consist of overhead transmission lines, located along or near CL&P’s existing overhead ROWs, whereas approximately 24 miles of the Project will be located underground, generally along or adjacent to road ROWs in urban areas of New Haven and Fairfield counties. CL&P’s existing overhead ROWs have generally been in existence for more than 60 years and typically range in width from about 125 feet to 320 feet.

Field investigations, conducted between 2002 and 2006, have identified approximately 168 wetlands along the overhead portion of the Project route in Middlesex and New Haven counties.<sup>1</sup> This *Wetland Invasive Species Control Plan* (“the Plan”) addresses the anticipated procedures for managing invasive species in and enhancing the value of wetlands located within the ROWs along the overhead portion of the Project. The *Plan* is designed to supplement CL&P’s existing ROW vegetation management procedures, which are summarized in Section 1.2.

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<sup>1</sup> The underground portion of the Project will not affect wetlands.

## **1.2 Review of Existing ROW Vegetation Management Program**

Approximately 96% of the Project is aligned along existing ROWs. As a result, virtually all of the wetlands along the overhead portion of the Project are located within or adjacent to CL&P's existing transmission line ROWs, within which both upland and wetland vegetation is presently maintained according to national and regional standards for electric transmission line operation. CL&P, through its parent company, Northeast Utilities, has incorporated these standards into its *Specification for Rights-of-Way Vegetation Management, Section III, Technical Requirements, 2006*, which is included in Appendix C of this *Plan*.

This well-established ROW maintenance program involves selective upland and wetland vegetation control using integrated vegetation management techniques. The program, which is performed cyclically (typically on a 4-year rotation), is targeted toward controlling the height of vegetation and limiting certain (predominantly upland) invasive species within the transmission line ROWs. The overall objective of the existing program is to maintain vegetation along ROWs to allow the safe operation and maintenance of the transmission facilities, while also improving species diversity and wildlife habitat. Specifically, the program is designed to reduce target tree and invasive shrub species densities, while encouraging the retention and establishment of low-growing, native plant communities. CL&P (through Northeast Utilities) reports annually on its ROW management strategy to the U.S. Environmental Protection Agency ("USEPA"), under that agency's Pesticide Environmental Stewardship Program.

## **1.3 Plan Objectives**

As a result of CL&P's historical and existing ROW maintenance practices, most of the wetlands along the Project's existing maintained ROWs are shrub-scrub or emergent marsh, and many are traversed by existing access roads. However, in order to accommodate the Project's 345-kV transmission structures (and to adhere to national and regional standards for clearance between 345-kV conductors and vegetation), additional clearing in certain forested wetlands will be required. In these areas, the wetlands will be converted to shrub-scrub or emergent marsh habitat for the life of the Project. In addition, approximately 4% of the Project route will be along new ROWs, where wetlands previously undisturbed by transmission lines will be affected.

Although not all of the wetlands along the existing ROWs will be directly affected by the construction of the new 345-kV transmission line, those areas that are disturbed could be subject to

colonization by invasive species. Further, for those wetlands in which invasive species are already prevalent, construction disturbance could promote additional colonization or the spread of invasives to nearby wetlands.

During the review of the Companies' permit and certificate applications for the Project, the Connecticut Siting Council ("CSC"), the U.S. Army Corps of Engineers ("ACOE"), USEPA, U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection ("DEP") Inland Water Resources Division ("IWRD") raised concerns about the potential spread of invasive species along the ROW. A condition of the CSC's April 7, 2005 approval of the Project (Docket No. 272) is to develop an invasive species control plan. The USEPA and DEP similarly requested an invasive species control plan, along with post-construction monitoring of wetland invasive species and the implementation of appropriate wetland invasive species controls as part of routine ROW vegetation management programs.

Accordingly, the purpose of this *Wetland Invasive Species Control Plan* is to:

- List the undesirable invasive plant species that may occur in wetlands along the overhead portion of the ROW;
- Identify as a baseline the wetlands along the ROW in which such invasive species presently exist;
- Provide a mechanism for monitoring the status of such species in wetlands along the ROW and coordinating with the involved agencies regarding the results of the monitoring;
- Define appropriate methods (e.g., mechanical cutting, chemical treatment, biological methods, or combination(s) thereof) for controlling or limiting the spread of such species in wetlands along the ROW; and
- Incorporate invasive wetland plant control strategies into CL&P's existing integrated vegetation management program for ROWs.

The overall objective of the invasive species control program will be on preserving and enhancing the value of wetlands along the Project ROWs, with a particular focus on those wetlands in which invasive species were not present prior to Project construction. It should be noted that certain invasive plants (e.g., purple loosestrife [*Lythrum salicaria L.*], common reed [*Phragmites australis*], multiflora rose [*Rosa multiflora*]) are relatively prevalent in the Project region. As a result, wholesale eradication of these species from wetlands on the ROW, when the same species are dominant in adjacent, off-ROW wetland areas, is unlikely.

## 2. INVASIVE SPECIES OF CONCERN IN WETLANDS

The DEP, under PA 03-136 and in cooperation with the Connecticut Invasive Plants Council (through the Invasive Plant Atlas of New England), has compiled a State list of invasive plants. The U.S. Department of Agriculture, Natural Resources Conservation Service also maintains a list of noxious plants, by state.

Based on a review of these lists and the characteristics of the Project area (as determined by field reviews of the ROW), the most common invasive species known or likely to be associated with or in wetlands along the Project route are provided in Table 2-1.

**Table 2-1  
Invasive Species Potentially Associated with Wetlands in the Project Area**

<b>Common Name</b>	<b><i>Latin Name</i></b>
Purple loosestrife	<i>Lythrum salicaria L.</i>
Common reed	<i>Phragmites australis</i>
Multiflora rose	<i>Rosa multiflora</i>
Asiatic bittersweet	<i>Celastrus orbiculatus</i>
Japanese barberry	<i>Berberis thunbergii</i>
Buckthorn	<i>Rhamnus spp.</i>
Tatarian honeysuckle	<i>Lonicera tatarica</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Reed canary grass	<i>Phalaris arundinacea L.</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Privet	<i>Ligustrum vulgare</i>
Spurge (leafy)	<i>Euphorbia esula L.</i>

### 3. BASELINE LOCATIONS OF INVASIVE SPECIES AND CHARACTERIZATION OF WETLANDS FOR INVASIVE SPECIES CONTROL

#### 3.1 Existing Wetland Conditions: Invasive Species and Functional Values

During the Project planning process, field surveys were conducted to identify vegetative communities, including wetlands, along the transmission line ROW. The following summarizes the wetland surveys and describes how the data compiled from such field investigations will be used in the implementation of this *Invasive Species Control Plan*.

Both field delineations of the wetlands along the Project route (which included the identification of predominant vegetation species (including invasive plants) in each wetland) and amphibian breeding studies were performed by Soil Science and Environmental Services, Inc. (“SSES”) between 2002-2006. In addition, a vegetation survey to identify the locations of certain upland and wetland plant species along the ROW, as required by the CSC, was performed in 2005. Reports and maps documenting these surveys, including detailed wetland data forms and photographs, are included in the following documents:

- Materials submitted as part of the Project permit applications to the DEP IWRD, the CSC, and the ACOE (refer, for example, to the Project’s October 2003 CSC Application, Volume 2, *Wetland and Waterways Description Report* and Volume 4, *Amphibian Breeding Survey*, prepared by SSES; to the 1” = 100’ aerial photo based map segments, which illustrate federal and state jurisdictional wetland boundaries; and to the updated wetlands data included in the ACOE application and amendments thereto); and
- The detailed Development and Management (“D&M”) Plans prepared pursuant to CSC requirements, for the overhead segments of the Project.

As part of the field surveys, information regarding the presence / absence and relative abundance of invasive species in each wetland was recorded on wetland delineation data forms. Information regarding the potential for amphibian breeding in each wetland also was noted.

In addition, SSES analyzed the wetland characteristics and functional quality of each wetland, based on the following standard environmental assessment criteria:

- Ecological integrity

- Wildlife habitat
- Finfish habitat
- Educational potential
- Visual/aesthetic quality
- Water-based recreation
- Flood control
- Groundwater availability
- Nutrient and sediment retention opportunity / removal efficiency

For each wetland, SSES applied its wetland expertise to assign “high”, “medium”, and “low” ratings to each of these wetland functional quality criteria (refer to the wetland data forms contained in the CSC Application, Volume 2 and in the ACOE permit application, as amended, for detailed wetland-specific information).

To provide a baseline for the monitoring and vegetation control program in this Plan, the information on invasive species and amphibian breeding potential developed for each wetland during the 2002-2006 field surveys was assembled from the wetland data forms / reports and is compiled in Appendix B of this *Plan*. Specifically, Table B-1 in Appendix B:

- Lists each of the wetlands along the ROW;
- Identifies the predominant vegetative species in each wetland;
- Indicates the types of invasive species (if any) present, using the list of such species contained in Table 2-1; and
- Defines whether the wetland supports potential amphibian breeding (identified in the table by the abbreviation “AB”).

Overall, Table B-1 summarizes baseline information concerning the wetlands in which invasive species presently occur, and provides the framework for future comparisons of pre- and post-construction conditions in wetlands along the Project ROW.

The data in Table B-1 demonstrates that one or more of the invasive species listed in Table 2-1 is presently found in approximately 75% of the wetlands along the Project ROW. The most common invasives are *Phragmites* and multiflora rose. The prevalence of these species reflects the overall

abundance of such invasives in the Project region and the types of land uses in areas adjacent to the ROW (e.g., suburban/urban development and associated disturbance to off-ROW wetlands may have promoted colonization by invasive species).

### **3.2 Characterization of Wetlands for Invasive Species Control**

To develop an effective approach for controlling invasive species in wetlands along the ROW, various factors must be considered. These include:

- The linear nature of the Project.
- The variations in characteristics and functional quality/value of the wetlands traversed.
- The lack of complete land use control (i.e., much of the ROW consists of easements across private properties rather than fee-ownership by CL&P).
- Adjacent land use developments, which can affect the value of wetlands on the ROW.
- The degradation of off-ROW adjacent wetland areas (i.e., colonization by invasive species).

As a result of these factors, it should be recognized that invasive species control measures may not be practical or highly effective in all of the wetlands along the ROW. Actual invasive species treatment in a particular wetland will be based on the results of the recommendations provided during the field monitoring and recorded on the invasive species monitoring forms (refer to Appendix A).



## 4. SCHEDULE FOR INVASIVE SPECIES MONITORING AND CONTROL

This section describes the approach and schedule first for monitoring and reporting on the status of invasive species along the overhead portion of the Project ROW and then for applying the results of the monitoring to define the areas where specific invasive species control measures are required and the schedule for implementing treatment. Section 5 describes the various types of control measures that are expected to be applicable to the types of wetlands along the ROW.

### 4.1 Monitoring Program

#### Objectives

CL&P is committed to the performance of ROW monitoring to assess the status of invasive species in wetlands along the overhead portion of the Project ROW and to identify areas where invasive species treatment measures will be required to maintain or enhance the value of individual wetlands.<sup>2</sup> This monitoring program will target the invasive species identified in Table 2-1 and will provide the recommendations that will be used to select and implement appropriate treatment options for each wetland (refer to Sections 4.2 and 5).

The objectives of the Project wetland invasive species monitoring program will be to:

- Update the status of invasive species in wetlands along the ROW, initially using the baseline wetland conditions identified in Table B-1 for comparative purposes, in order to target the areas where control measures are required;
- Define the types of control measures that are most appropriate for each wetland; and
- Provide input to allow the incorporation of wetland invasive species control measures into CL&P's overall ROW vegetation management program.

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<sup>2</sup> *NOTE:* As part of the mitigation for wetland impacts associated with the Project, the Companies have committed to a special ROW restoration and invasive species control program along the portion of the ROW that traverses Eisenhower Park in the City of Milford, New Haven County. Detailed wetland and upland revegetation plans are being developed for this ROW segment. Accordingly, wetland restoration/enhancement, monitoring, and the implementation of invasive species controls for this area will be pursuant to the conditions of the mitigation plan specific to the portion of the ROW through the Park, and will not necessarily be governed by the invasive species monitoring and control implementation schedule for the rest of the overhead ROW.

### **Monitoring Program Implementation**

To conduct the monitoring program, CL&P will either train its employees in the identification of the invasive species of concern, or will retain a qualified independent researcher (e.g., local university, environmental consulting firm). The monitoring program will consist of field investigations of each wetland along the ROW to determine whether invasive species are present and, if so, to provide recommendations concerning control options.

The pre-construction baseline information regarding the current status of invasive species in each wetland (refer to Appendix B) will be used as the initial framework for the monitoring. For each wetland, invasive species monitoring forms will be completed, along with appropriate photo-documentation. Any conditions in a particular wetland that would influence the use of a particular type of invasive control method would be noted on these forms. An example of a possible monitoring form is included in Appendix A.

### **Monitoring Schedule**

Initial invasive species monitoring in wetlands along the ROW will be conducted in the first year following the completion of Project construction and each year for four years thereafter (total of five years of annual monitoring; refer to Table 4-1). The goal of this five-year monitoring effort will be to identify locations where invasive species are present so that control measures can be implemented as soon as practical, particularly in any wetlands where invasive species are beginning to colonize as a potential result of Project construction disturbance.

The five years of annual monitoring also will allow an evaluation of the effectiveness of both initial and follow-up invasive species control measures. In addition, it will provide a database concerning the characteristics of the wetlands along the ROW, post-construction.

**Table 4-1  
Five-Year Schedule for Invasive Species Monitoring and Control**

Year	Activity
1	<ul style="list-style-type: none"> <li>• Monitor and report</li> <li>• Implement invasive species control measures (mechanical, chemical, biological, or a combination of measures will be used)</li> </ul>
2	<ul style="list-style-type: none"> <li>• Monitor and report</li> </ul>
3	<ul style="list-style-type: none"> <li>• Monitor and report</li> <li>• Implement invasive species control measures (mechanical, chemical, biological, or a combination of measures will be used)</li> </ul>
4	<ul style="list-style-type: none"> <li>• Monitor and report</li> </ul>
5	<ul style="list-style-type: none"> <li>• Monitor and report</li> <li>• Implement invasive species control measures (mechanical, chemical, biological, or a combination of measures will be used)</li> </ul>

In the initial year and for all subsequent monitoring years, the field investigation program will be conducted during the growing season, when plant species are most easily identifiable. The monitoring effort will be scheduled to allow time for invasive species treatments to be implemented in the same growing season.

After the completion of the initial five years of monitoring and associated invasive species treatments, the schedule for long-term wetland monitoring and invasive species control on the Project ROW will be integrated with CL&P's existing ROW vegetation management program (refer also to the discussion under *Monitoring Report*, below). Because CL&P's current ROW vegetation management program is typically conducted on a four-year cycle, in the longer term, the wetland invasive species monitoring and reporting will be performed in the year prior to such routine maintenance work. Thus, the first sequence of this routine monitoring, followed by treatment measures, will commence in the eighth year after the completion of Project construction:

- Year 8: Conduct invasive species monitoring and reporting
- Year 9: Implement invasive species control measures (mechanical, chemical, biological, or a combination of measures will be used)

This same sequence will be repeated thereafter on a four-year cycle (the next monitoring will occur in Year 12, followed by treatment in Year 13, etc.).

This schedule will allow the treatment recommendations resulting from the monitoring effort to be incorporated into the routine ROW maintenance effort. Over time, as wetland invasive species treatments become an integral part of CL&P's ROW vegetation management program, monitoring and invasive species control schedules may be adjusted to respond to site-specific issues, if required. For example, in some areas, aggressive invasive species control measures may be required that involve treatment during several consecutive years, rather than simply on a four-year cycle.

### **Monitoring Report**

The results of each year's invasive species field monitoring will be compiled into a brief report, which will include a summary of the field results, a table that identifies the locations of invasive species (by wetland) along the ROW, and copies of the monitoring forms and wetland photographs. Comparisons will be made as to whether invasive species are becoming more or less prevalent, based on a review of the baseline (pre-construction) wetland data and on trends over time (as the monitoring program progresses). In addition, the monitoring report will include recommendations regarding where invasive species control measures are warranted and, if so, the anticipated type of controls and the schedule for the implementation of control measures.

During the first five years of monitoring, a monitoring report will be submitted annually. The monitoring report will be provided for informational purposes to the CSC, ACOE, and DEP IWRD by the end of the calendar year in which the monitoring was conducted. Thereafter, the schedule for the submission of a monitoring report, if required, will be determined based on the results of consultations with the involved agencies.

However, implementation of invasive species control measures will be performed as recommended based on the results of the monitoring and will not require agency pre-approvals. The application of invasive species control measures will be performed pursuant to any standard permit and safety requirements governing such activities.

If requested, CL&P will be available to meet with the involved agencies to review the results of the invasive species monitoring and subsequent treatment program. The purpose of such meeting(s)

would be to assess the status of the program and the effectiveness of the monitoring and subsequent invasive species control approaches.

#### **4.2 Schedule for Implementation of Invasive Species Controls**

CL&P recognizes that early treatment measures can prevent the spread of invasive species, particularly in wetlands where such species were not present prior to Project construction. As a result, CL&P will implement an aggressive invasive control approach in the first five years immediately following the completion of construction. Particular treatment efforts will be focused on preserving and enhancing the value of high and moderate quality wetlands (as identified in Table B-1 and in subsequent monitoring).

Based on the results of the monitoring program conducted in each of the first five years after the completion of Project construction, CL&P will schedule invasive species treatment measures annually, as soon as practical after the field monitoring recommendations are received. The schedule for the treatment will depend on the types of controls recommended. For example, mechanical removal of certain invasives (e.g., *Phragmites*) could be performed at any time of the year, whereas the use of biological controls or cutting followed by spraying will require work during the growing season. In the long-term, CL&P anticipates that the wetland invasive species treatment program will be performed as a routine part of its overall ROW vegetation management efforts.

Depending on the results of the monitoring, CL&P also may retain a licensed professional horticulturist and/or wetland scientist to work with its ROW management personnel; to oversee the implementation of control measures, to recommend methods for maximizing the potential re-establishment of native vegetation; and, if warranted, to suggest wetland plantings to enhance wetland habitat values. For locations where invasive species controls are implemented, the monitoring performed in subsequent years will serve to assess the effectiveness of such measures.

## 5. INVASIVE SPECIES CONTROL OPTIONS

The best approach for eradicating or otherwise controlling invasives in a particular wetland along the ROW will depend on the characteristics of the affected wetland and adjacent land uses, the type and density of the invasives to be controlled, and the cooperation of the landowner (if the wetland is on a portion of the ROW easement located on privately-owned property and the selected treatment option requires landowner concurrence). For the most part, the selected treatment measures will be implemented during the growing season and will be conducted by CL&P or appropriate CL&P contractors licensed to perform the required treatment measures. Any factors that could affect the type of treatment method or the schedule for treatment in a particular wetland will be noted on the Invasive Species Monitoring Forms (refer to Appendix A).

In general, there are three broad types of invasive species controls:

- Biological;
- Mechanical; and
- Chemical.

Mechanical and chemical controls also may be combined to provide a fourth alternative.

Of these options, **chemical control (herbicides)** is the alternative typically used for controlling the majority of invasive species such as purple loosestrife, multiflora rose, and *Phragmites* along ROWs. If used selectively and in limited areas (as would be the case in the wetlands along the Project ROW), herbicides can be successfully applied in an environmentally-sound manner.

**Mechanical control measures**, such as digging/pulling or cutting, may be effective in controlling isolated invasive plants or small stands of plants. However, such techniques may be labor-intensive and, in wetlands characterized by dense infestations of invasives such as *Phragmites*, could require extensive excavation within the wetlands.

**Biological controls** can be effective in controlling purple loosestrife under certain conditions, but are not yet proven for the control of other invasives. Consultations with the ACOE indicate that species

such as loosestrife beetles (*Galerucella californiensis*, *G. pusilla*) and *Nanophyes marmoratus* (weevil), may be useful in controlling purple loosestrife. At present, however, purple loosestrife has been identified in only five wetlands along the Project ROW. If biological controls are identified as practical for treating the purple loosestrife in these areas, CL&P would first have to obtain landowner permission prior to implementation.

Although specific treatments will be refined based on the results of the monitoring program, it is anticipated that the most effective general approach for controlling invasive species in the majority of wetlands along the ROW will likely be to apply herbicides during the growing season (summer through fall) and then to cut (mulch) the invasives during the winter. Repeat spot herbicide application may be required in the following growing season in order to achieve effective control.

In general, this approach is expected to be applied to control invasive species in targeted wetlands, as follows:

- Wetlands along new ROW (i.e., where the Project diverges from established transmission line easements).
- Wetland locations where infestations of an invasive species are spreading or are likely to spread to other wetlands along the ROW, into areas where such species were not found prior to construction.
- Locations where an invasive species is threatening the wetland function and value by covering greater than 75% of the wetland area and where the on-ROW wetland area is not linked to off-ROW areas that contain relatively the same density of the invasive species.

The need for and types of chemical control of invasive species in wetlands will be carefully evaluated, particularly because a majority of the ROW is not on land owned by the Companies, but rather is an easement across private properties. In addition, many of the wetlands along the ROW extend off-ROW onto private properties. Non-Project related activities in off-ROW wetlands may result in colonization of on-ROW areas by invasive species. The Companies have no authority to attempt to control invasive species that may be currently present in, or begin to colonize, adjacent off-ROW wetland areas.

Any herbicide applications in wetlands will be performed using appropriate products, in accordance with all applicable standards and regulations. Further, all herbicide use will be in accordance with label instructions, and will be conducted by or under the supervision of certified applicators. The

type of herbicide(s) to be used, method of application, and schedule for application will be determined based on the locations of the targeted wetlands and the particular invasive species to be controlled.

Similarly, the use of any biological control measures will be coordinated with the DEP and other agencies, as appropriate. The species used for biological control will be obtained from approved sources and released pursuant to specifications.



**APPENDIX A**

**INVASIVE SPECIES MONITORING FORM  
(EXAMPLE)**

**INVASIVE SPECIES MONITORING REPORT FORM  
MIDDLETOWN-NORWALK 345-kV PROJECT**

DATE: \_\_\_\_\_ NAME OF OBSERVER: \_\_\_\_\_

<b>WETLAND CHARACTERISTICS</b>	
<p><b>1. Wetland Number:</b></p> <p><b>2. Location:</b></p> <ul style="list-style-type: none"> <li>• Municipality:</li> <li>• Transmission Structure Nos.:</li> </ul> <p><b>3. Wetland Type:</b></p> <p><b>4. Wetland Vegetation (species/abundance)</b></p> <ul style="list-style-type: none"> <li>• Shrub</li>   <li>• Herbs</li>   <li>• Vines</li> </ul> <p><b>5. Wetland Functions and Values:</b></p> <p><b>6. Predominant Adjacent Land Uses:</b></p> <p><b>7. Photograph Reference Nos.</b></p>	

Are invasive species present? \_\_\_\_\_ No \_\_\_\_\_ Yes

- If yes, identify potential source of invasives: \_\_\_\_\_
- If yes, complete table: \_\_\_\_\_

**ESTIMATE OF INVASIVE SPECIES PLANT DENSITY IN WETLAND ON ROW**  
(Provide for each type of invasive species observed)

Invasive Species (Name)	Density (Est. % of Wetland with Invasive Species)			
	<10	10-25%	25-50%	>50%

**CONDITION OF WETLANDS IN OFF-ROW AREAS**

1. Wetland type: \_\_\_\_\_

2. Are invasive species present? \_\_\_\_\_ No \_\_\_\_\_ Yes

3. Estimate of species density (% of wetland area observed): \_\_\_\_\_

**RECOMMENDATIONS FOR INVASIVE SPECIES CONTROL:** \_\_\_\_\_

**OTHER NOTES:** \_\_\_\_\_

**APPENDIX B**

**TABLE OF PRE-CONSTRUCTION WETLAND CHARACTERISTICS AND  
INVASIVE SPECIES**

**Table B-1  
Existing Wetland Vegetation Characteristics Along the Overhead Portion of the Middletown – Norwalk Transmission Line Route**

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y / N)
<i>Scovill Rock to Chestnut Junction</i>				
1	1	Wooded swamp	Red maple, black cherry, spicebush, Japanese barberry, Skunk cabbage	Y Barberry
1	2	Wooded /shrub swamp, shallow marsh, pond (AB)	Red maple, tulip, spicebush, Phragmites, skunk cabbage, tussock sedge	Y Phragmites
1	3	Shrub swamp	Sweet pepperbush, willow, sedges, skunk cabbage, sensitive fern	N
1	4	Shrub swamp, shallow marsh	Highbush blueberry, red raspberry, Phragmites, sensitive fern, cinnamon fern	Y Phragmites
2	5	Shrub swamp and shallow marsh	Red maple, sweet pepperbush, Phragmites	Y Phragmites
3	6A/6B	Shrub swamp with perennial watercourse	Alder, sweet pepperbush, elderberry, skunk cabbage, soft rush, sedges. Goldenrod, Phragmites	Y Phragmites
3	7	Shrub swamp	Red raspberry, elderberry, skunk cabbage, goldenrod, jack-in-the-pulpit	N
3	8	Shallow marsh with int. watercourse	Red maple, multiflora rose, sweet pepperbush, Phragmites, jewelweed, sedges, poison ivy, cinnamon fern	Y Phragmites Multiflora rose
4	9	Shallow marsh with perennial watercourse (Bible Rock Brook)	Willow, multiflora rose, red maple, Phragmites, cattail, skunk cabbage, woolgrass, alder, bittersweet	Y Phragmites, Multiflora rose
5	10	Wooded (deciduous) swamp with perennial watercourse	Red maple, black birch, willow, multiflora rose, skunk cabbage, cinnamon fern	Y Multiflora rose
6	11	Wooded swamp (deciduous)	Red maple, ash, witch hazel, multiflora rose, Japanese barberry, mountain laurel, sedges, cinnamon fern	Y Multiflora rose; barberry
6	12	Shallow marsh and shrub swamp (AB)	Sweet pepperbush, steeplebush, soft rush, sedges, cinnamon fern, sphagnum moss	Y Phragmites

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
6	13	Shrub swamp with int. watercourse	Sweet pepperbush, highbush blueberry, tussock sedge, cinnamon fern, sensitive fern, skunk cabbage	N
6	14	Shrub swamp with int. watercourse	Highbush blueberry, steepplebush, sedges, cinnamon fern	N
7	15	Shrub swamp with perennial watercourse (Trib. to Bible Rock Brook)	Alder, gray birch, steepplebush, red maple, skunk cabbage, sedges, woolgrass, false hellebore, Phragmites, bittersweet	Y Phragmites
7	16	Shrub swamp and shallow marsh with int. watercourse (AB)	Sweet pepperbush, red maple, gray birch, multiflora rose, sedges, skunk cabbage, soft rush, Phragmites, horsetail, blue vervain	Y Phragmites
8	17	Shrub swamp with standing water (AB)	Sweet pepperbush, buttonbush, swamp rose, alder, soft rush, purple loosestrife, bittersweet, blueberry	Y Purple Loosestrife
8	18	Shrub swamp	Sweet pepperbush, steepplebush, sensitive fern, sedges, Joe pye weed, sphagnum moss	N
9	19	Shrub swamp and shallow marsh with standing water	Swamp rose, steepplebush, multiflora rose, sedges, sensitive fern, soft rush	Y Multiflora rose
9	20A	Shrub swamp and shallow marsh with int. watercourse	Alder, multiflora rose, spicebush, sweet pepperbush, sensitive fern, sedges, horsetail, tussock sedge, soft rush, Phragmites	Y Phragmites, Multiflora rose
9	20B	Shrub swamp and shallow marsh with int. watercourse	Alder, multiflora rose, willow, bayberry, sensitive fern, sedges, cinnamon fern, skunk cabbage, soft rush, Phragmites	Y Phragmites, Multiflora rose
<b>Oxbow Junction to Beseck Substation</b>				
10	21	Pond	Sedges, rushes	N
12	22	Wet meadow and shallow marsh	Multiflora rose, winterberry, red raspberry, tatarian honeysuckle, steepplebush, soft rush, skunk cabbage, sedges, Phragmites, garlic mustard	Y Phragmites, Multiflora rose
13	23	Shrub swamp with perennial watercourse (Summer Brook)	Tatarian honeysuckle, multiflora rose, steepplebush, greenbrier, soft rush, sedges, skunk cabbage	Y Multiflora rose
13	24	Shrub swamp with int. watercourse (AB)	Steepplebush, winterberry, multiflora rose, sedges, skunk cabbage, tussock sedge, highbush blueberry	N
13	25	Shallow marsh and shrub swamp with int. watercourse (AB)	Winterberry, multiflora rose, elderberry, manna grass, tussock sedge, sensitive fern	Y Multiflora rose

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
14	26	Shallow marsh and shrub swamp with int. watercourse. <b>Vernal pool. (AB)</b>	Winterberry, multiflora rose, sensitive fern, Phragmites, cinnamon fern, bittersweet, cedar	Y Multiflora rose, Phragmites
15	27	Shrub swamp and shallow marsh	Highbush blueberry, steeplesbush, red maple, red cedar, sedges, soft rush, sensitive fern, tussock sedge, bittersweet, barberry	N
16	28	Shrub swamp with perennial watercourse (Ball Brook)	Silky dogwood, willow, chokeberry, Japanese barberry, jewelweed, goldenrod, skunk cabbage, tussock sedge, bedstraw, garlic mustard	Y Barberry
17	31	Shrub swamp with int. watercourse	Multiflora rose, arrowwood, willow, alder, chokeberry, Phragmites, sedges, jewelweed, soft rush, wool grass, tussock sedge, silky dogwood, gray dogwood, greenbrier	Y Phragmites, Multiflora rose
18B	ROB1	Deciduous wooded swamp, with pond	Red maple, black birch, gray birch, multiflora rose, arrowwood, Japanese barberry, jewelweed, sensitive fern, poison ivy, bittersweet	Y Barberry, Multiflora rose
18B/C	ROB2	Shrub swamp (AB)	Red maple, black cherry, willow, highbush blueberry, winterberry, sedges, sensitive fern	N
18C	ROB3	Shrub swamp	Swamp rose, willow, winterberry, sedges, sensitive fern, grape, Virginia creeper	N
18C	ROB4	Shrub swamp	Swamp rose, willow, steeplesbush, sedges, sensitive fern, soft rush	N
18C	ROB5	Shrub swamp, shallow marsh, drainage swale	Willow, red maple, multiflora rose, olive, Phragmites, sedges	Y Phragmites, Multiflora rose
18C/D	ROB6	Deciduous wooded swamp (AB)	Red maple, ash, yellow birch, elm, spicebush, highbush blueberry, ironwood, winterberry, tussock sedge, jewelweed, cinnamon fern, false hellebore, greenbrier	N
20	34	Shrub swamp and wet meadow (pasture)	Alder, winterberry, arrowwood, field grasses, cinnamon fern	N
21	35	Shrub swamp with int. watercourse	Arrowwood, multiflora rose, silky dogwood, highbush blueberry, goldenrod	Y Multiflora rose
23	36	Shrub swamp with in. watercourse	Autumn olive, multiflora rose, willow, garlic mustard, jewelweed	Y Multiflora rose, autumn olive
23	37	Wet meadow	Multiflora rose, sedges, soft rush, purple loosestrife, tussock sedge, sensitive fern, bittersweet	Y Purple loosestrife, Multiflora rose

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y / N)
23/24	38	Shrub swamp, shallow marsh and wet meadow with Coghinchaug River and Sawmill Brook (AB)	Silky dogwood, arrowwood, multiflora rose, alder, willow, steeplebush, Reed canary grass, purple loosestrife, soft rush, tussock sedge, sedges, mowed grasses, Phragmites, cedar	Y Purple loosestrife; Phragmites, Multiflora rose
28	39	Shrub swamp and shallow marsh	Northern arrowwood, willow, silky dogwood, sedges, tussock sedge, sensitive fern, soft rush, steeplebush, cedar, sumac, olive, multiflora rose	Y Multiflora rose
28	40	Shrub swamp and shallow marsh	Alder, arrowwood, red maple, multiflora rose, soft rush, bittersweet	Y Multiflora rose
28	41	Shrub swamp with int. watercourse	Silky dogwood, winterberry, sensitive fern, tussock sedge, multiflora rose, Japanese barberry, olive	Y Multiflora rose
28	42	Shrub swamp with int. watercourse	Multiflora rose, winterberry, sensitive fern, alder	Y Multiflora rose
30/31	43	Shrub swamp, shallow marsh and open water pond with Asmun Brook (AB)	Alder, willow, silky dogwood, multiflora rose, red cedar, steeplebush, sedges, tussock sedge, skunk cabbage, purple loosestrife, greenbrier	Y Purple loosestrife, Multiflora rose
32	44	Wooded swamp with perennial stream	Red maple, elm, ash, multiflora rose, silky dogwood, skunk cabbage, jewelweed, sumac, bittersweet	Y Multiflora rose
33 / 43A	45	Shrub swamp and shallow marsh (AB)	Silky dogwood, multiflora rose, bayberry, soft rush, sensitive fern, rice cutgrass, goldenrod, Phragmites	Y Phragmites, Multiflora rose
<b>Black Pond Junction to Beseck Substation</b>				
34	46	Shrub swamp and shallow marsh (AB)	Silky dogwood, alder, multiflora rose, red cedar, sedges, cattail, soft rush	Y Multiflora rose
34	47	Shrub swamp and shallow marsh	Red maple, silky dogwood, multiflora rose, red raspberry, arrowwood, Phragmites, jewelweed, bittersweet, olive, sumac	Y Phragmites, Multiflora rose
35	48	Shrub swamp associated with Black Pond (AB)	Buttonbush, silky dogwood, multiflora rose, swamp azalea, horsetail, goldenrod, sensitive fern, olive, sumac	Y Multiflora rose
36	49	Shrub swamp border associated with New Dam Pond	Buttonbush, willow, multiflora rose, pond lily	Y Multiflora rose

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
36/37	50	Shrub swamp with perennial watercourse	Silky dogwood, willow, alder, ironwood, cinnamon fern, skunk cabbage, sedges, jewelweed, jack-in-the-pulpit, tussock sedge, reed canary grass, Phragmites (uncommon)	Y Phragmites
37/38	51	Shrub swamp and shallow marsh with perennial watercourse	Silky dogwood, multiflora rose, raspberry, sedges, tussock sedge, sensitive fern, cattail, jewelweed	Y Multiflora rose
38	52	Pond and spillway with perennial watercourse	Multiflora rose, elm, cinnamon fern, cattail	Y Multiflora rose
39	53	Pond with int. watercourse and shrub swamp fringe	Willow, alder, multiflora rose	Y Multiflora rose
39/40	54	Pond with int. watercourse and shrub swamp fringe	Silky dogwood, alder, multiflora rose, willow, jewelweed, sensitive fern	Y Multiflora rose
40	55	Pond with int. watercourse	Mowed lawn	N
<b>Beseck Substation to E. Wallingford Junction</b>				
44/45/46	56	Shallow marsh, shrub swamp	Steeplebush, multiflora rose, arrowwood, red cedar, sedges, tussock sedge, skunk cabbage, Phragmites (uncommon)	Y Phragmites, Multiflora rose
48	57	Shrub swamp and shallow marsh	Willow, steeplebush, multiflora rose (uncommon), sedges, sensitive fern, tussock sedge, blue vervain, Phragmites	Y Phragmites, Multiflora rose
50	58	Wet meadow	Silky dogwood (uncommon), soft rush, sensitive fern, reed canary grass	Y Reed canary grass
50	59	Shrub swamp and shallow marsh with perennial stream (Spring Brook) (AB)	Silky dogwood, multiflora rose, alder, sedges, cattail, skunk cabbage, soft rush, iris, woolgrass	Y Multiflora rose
51	60	Shrub swamp	Multiflora rose, willow, arrowwood, Phragmites, goldenrod, jack-in-the-pulpit	Y Phragmites, Multiflora rose
52	61	Shrub swamp and shallow marsh with perennial watercourse (Muddy River) (AB)	Silky dogwood, multiflora rose, alder, sedges, skunk cabbage, tussock sedge, reed canary grass	Y Reed canary grass, Multiflora rose



Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
53	62	Shrub swamp and shallow marsh with int. watercourse	Multiflora rose, steeplebush, willow, silky dogwood, bayberry, reed canary grass, jewelweed, sedges	Y Reed canary grass, Multiflora rose
53	63	Wet meadow (mowed)	Reed canary grass, iris, sensitive fern	Y Reed canary grass
55	64	Wet meadow and shrub swamp	Silky dogwood, sedges, soft rush, reed canary grass, barnyard grass, Phragmites (uncommon)	Y Phragmites, reed canary grass
56	65	Wet meadow and shrub swamp with perennial watercourse (Trib. to MacKenzie Reservoir)	Multiflora rose, steeplebush, tatarian honeysuckle, alder, skunk cabbage	Y Honeysuckle Multiflora rose
56	66	<b>Vernal pool</b> with shrubby and herbaceous vegetation (AB)	Steeplebush, arrowwood, swamp azalea, sedges, cinnamon fern	N
58	67	Shrub swamp and shallow marsh with int. watercourse	Silky dogwood, winterberry, sedges, Phragmites, blue vervain	Y Phragmites
58/59	68	Wet meadow (active pastureland with pond)	Soft rush, skunk cabbage, sedges, cattail	N
59	69	Shrub swamp with perennial watercourse	Silky dogwood, willow, multiflora rose, reed canary grass, skunk cabbage, jewelweed, garlic mustard	Y Multiflora rose, reed canary grass
60/61	70	Shrub swamp (AB)	Buttonbush, red maple, highbush blueberry, winterberry, swamp azalea, elderberry, arrowwood, multiflora rose, skunk cabbage, tussock sedge, Phragmites (moderate), duckweed, cinnamon fern, reed canary grass	Y Multiflora rose, reed canary grass, Phragmites
61/62	71	Shallow marsh and shrub swamp	Arrowwood, silky dogwood, steeplebush, multiflora rose, elderberry, winterberry, sedges, reed canary grass, skunk cabbage, Phragmites	Y Multiflora rose, reed canary grass, Phragmites
62/63/64	72A (TGCB1 )	Deciduous swamp, pond	Red maple, black birch, elm, sugar maple, ash, multiflora rose, tatarian honeysuckle, spicebush, arrowwood, jewelweed, skunk cabbage, Virginia creeper, garlic mustard, sensitive fern,	Y Multiflora rose, honeysuckle

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
<i>East Wallingford Junction to Wallingford Junction</i>				
65	75	Shrub swamp	Silky dogwood, privet, raspberry, alder, skunk cabbage, sedges, jewelweed soft rush, tussock sedges, blue vervain, sensitive fern	Y privet
66	76	Shrub swamp and shallow marsh	Swamp rose, silky dogwood, steeplebush, red maple, skunk cabbage, tussock sedge, sensitive fern, blue vervain, soft rush, willowherb, lurid sedge	N
67	77	Shallow marsh	Arrowwood, silky dogwood, multiflora rose, skunk cabbage, soft rush, jewelweed, Phragmites	Y Multiflora rose, Phragmites
67	78	Shrub swamp	Arrowwood, winterberry, sedges, soft rush	N
67/68	79	Shrub swamp	Arrowwood, steeplebush, elderberry, sensitive fern, sedges, joe pye-weed, jack-in-the-pulpit	N
68	80	Shrub swamp with perennial stream (Wharton Brook, trib. to Quinipiatic River)	Multiflora rose, silky dogwood, arrowwood, sedges, skunk cabbage, soft rush, woolgrass	Y Multiflora rose
70	81	Shallow marsh with ditches, int. watercourse	Phragmites, sedges, pennycress, ragweed	Y Phragmites
71/72	82	Shrub swamp and shallow marsh with Quinipiatic River (AB)	Willow, red maple, buttonbush, multiflora rose, pin oak, cattail, sedges	Y Multiflora rose
73	83	Shrub swamp with int. watercourse	Elderberry, multiflora rose, Japanese barberry, skunk cabbage, jewelweed, sensitive fern, jack-in-the-pulpit, cinnamon fern	Y Multiflora rose, barberry
76/77	84	Shallow marsh, ponds, with perennial watercourse	Sedges, soft rush, cinnamon fern, skunk cabbage, manna grass, spike rush, fox sedge	N
77/78	85	Shallow marsh and shrub swamp with int. watercourse	Willow, multiflora rose, chokeberry, arrowwood, alder, red maple, sensitive fern, Phragmites, tussock sedge, sedges, cinnamon fern	Y Multiflora rose, Phragmites
79	86	Shallow marsh and shrub swamp	Willow, raspberry, sedges, skunk cabbage, Phragmites, cinnamon fern, sensitive fern, jewelweed	Y Phragmites
80	87	Shallow marsh and shrub swamp with int. watercourse	Willow, multiflora rose, winterberry, sedges, Canada rush, sensitive fern, Phragmites, reed canary grass	Y Multiflora rose, reed

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y / N)
80	88	Wet meadow (mowed) and shrub swamp with int. watercourse	Silky dogwood, multiflora rose, willow, sedges, soft rush, tussock sedge, blue vervain	Y Multiflora rose
80/81	89	Shrub swamp	Willow, silky dogwood, arrowwood, red maple, sedges, tussock sedge, Phragmites, skunk cabbage, soft rush	Y Phragmites
81	90	Shrub swamp	Arrowwood, multiflora rose, willow, raspberry, Phragmites, goldenrod	Y Multiflora rose, Phragmites
81/82	91	Shrub swamp with perennial stream	Multiflora rose, arrowwood, skunk cabbage, sensitive fern tussock sedge	Y Multiflora rose
<b>Cook Hill Junction to East Devon Substation</b>				
83	92	Shallow marsh and shrub swamp	Steeplebush, winterberry, arrowwood, multiflora rose, sedges, soft rush, goldenrod	Y Multiflora rose
84	93	Shallow marsh and shrub swamp with int. watercourse	Multiflora rose, winterberry, skunk cabbage, tussock sedge	Y Multiflora rose
84	94	Shallow marsh	Multiflora rose, winterberry, silky dogwood, steeplebush, soft rush, sedges, goldenrod	Y Multiflora rose
85	95	Shrub swamp with Mill River	Silky dogwood, multiflora rose, sedges, jewelweed, wild geranium, false hellebore	Y Multiflora rose
85	96	Shallow marsh and wet meadow	Willow, silky dogwood, multiflora rose, sedges, soft rush, Canada rush, Phragmites, mountain mint, goldenrod, Queen Anne's lace	Y Multiflora rose, Phragmites
85/86	97	Shrub swamp and shallow marsh with perennial watercourse (Willow Brook) (AB)	Winterberry, arrowwood, willow, steeplebush, swamp azalea, tussock sedge, sensitive fern, woolgrass, iris, skunk cabbage	N
86	98	Shrub swamp with perennial watercourse (AB)	Willow, multiflora rose, arrowwood, red maple, tussock sedge, sensitive fern	Y Multiflora rose
86/87	99	Shrub swamp with perennial watercourse	Silky dogwood, steeplebush, multiflora rose, arrowwood, sedges, tussock sedge,	Y

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y / N)
		(AB)	skunk cabbage, sensitive fern, cinnamon fern, wild geranium, tall meadow rue	Multiflora rose
88	100	Shrub swamp with int. watercourse	Multiflora rose, tatarian honeysuckle, arrowwood, steeplebush, reed canary grass, ragweed, goldenrod, poison ivy	Y Multiflora rose, reed canary grass, honeysuckle
88/89	101	Shrub swamp (AB)	Arrowwood, winterberry, steeplebush, soft rush, sedges, woolgrass, wild geranium, sensitive fern, poison ivy, jewelweed	N
89	102	Shallow marsh	Steeplebush, red cedar, elderberry, arrowwood, swamp azalea, goldenrod, soft rush, wild geranium, sedges, woolgrass	N
89	103	Shrub swamp with perennial watercourse (Jepp Brook) (AB)	Arrowwood, elderberry, steeplebush, cattail, skunk cabbage, tussock sedge, soft rush, sedges, joe-pye-weed	N
90	104	Shrub swamp	Arrowwood, elderberry, steeplebush, sedges, soft rush, goldenrod	N
90	105	Shrub swamp with int. watercourse	Multiflora rose, elderberry, winterberry, sedges, skunk cabbage, cinnamon fern, cattail, soft rush, goldenrod	N
92	106	Shrub swamp with perennial watercourse	Arrowwood, willow, alder, sedges, skunk cabbage, cinnamon fern, tussock sedge, sensitive fern, wild geranium, soft rush	N
92	107	Shallow marsh	Tatarian honeysuckle, arrowwood, multiflora rose, sedges, skunk cabbage, sensitive fern, cinnamon fern, Phragmites	Y Multiflora rose, Phragmites
92/93	108	Shallow marsh and shrub swamp with int. watercourse	Arrowwood, elderberry, steeplebush, multiflora rose, Phragmites, skunk cabbage, sedges, iris, horsetail, cinnamon fern, cattail, wild geranium, soft rush, jewelweed, sensitive fern	Y Multiflora rose, Phragmites
96/97	109	Shallow marsh and shrub swamp with int. watercourse	Red maple, multiflora rose, steeplebush, Japanese barberry, silky dogwood, winterberry, sensitive fern, soft rush, sedges, goldenrod, joe-pye-weed, Phragmites	Y Multiflora rose, barberry, Phragmites
98	110	Shrub swamp	Red maple, winterberry, sedges, skunk cabbage, cinnamon fern, soft rush, woolgrass	N
99/100	111	Shallow marsh	Steeplebush, greenbrier, raspberry, multiflora rose, sedges, cinnamon fern, skunk cabbage, Phragmites	Y Multiflora rose, Phragmites
100	112	Shrub swamp with perennial stream (West River)	Japanese barberry, multiflora rose, silky dogwood, winterberry, arrowwood, sedges, skunk cabbage, tussock sedge, soft rush	Y Multiflora rose, barberry

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
100/101	113	Shallow marsh and shrub swamp with perennial watercourse	Steeplebush, winterberry, alder, reed canary grass, skunk cabbage, goldenrod, soft rush	Y Reed canary grass
101	114	Shallow marsh with int. watercourse	Steeplebush, winterberry, highbush blueberry, skunk cabbage, reed canary grass, cattail, woolgrass, soft rush	Y Reed canary grass
102	115/115 A	Shallow marsh	Winterberry, sedges, skunk cabbage, sensitive fern, woolgrass, cattail, soft rush, blue vervain, cinnamon fern, reed canary grass, jewelweed	Y Reed canary grass
103	116	Shrub swamp and shallow marsh	Winterberry, greenbrier, steeplebush, multiflora rose, sedges	Y Multiflora rose
103	117	Shrub swamp	Steeplebush, winterberry, mountain laurel, sedges, goldenrod, woolgrass	N
103	118	Shrub swamp	Steeplebush, highbush blueberry, winterberry, sedges, sensitive fern	N
104	119	Shrub swamp (AB)	Redtop, silky dogwood, winterberry, multiflora rose, arrowwood, skunk cabbage, goldenrod, greenbrier, cattail, sedges	Y Multiflora rose
104	120	Shrub swamp	Raspberry, multiflora rose, silky dogwood, steeplebush, arrowwood, Phragmites, tussock sedge, goldenrod, sensitive fern	Y Multiflora rose
104/105	121	Shrub swamp with int. watercourse	Willow, witch-hazel, multiflora rose, skunk cabbage, cinnamon fern	Y Multiflora rose
105/106	122	Shrub swamp with int. watercourse	Steeplebush, winterberry, red maple, sedges, tussock sedge	N
108	123	Glen Dam Reservoir (open water) with wooded shoreline	N/A open water	N/A
109	124	Shrub swamp and shallow marsh	Winterberry, willow, tussock sedge, skunk cabbage, iris, Phragmites	Y Phragmites
110	125	Shrub swamp and shallow marsh with int. watercourse (AB)	Gray dogwood, winterberry, multiflora rose, steeplebush, sedges, soft rush, sensitive fern, tussock sedge, royal fern, spike rush, skunk cabbage	Y Multiflora rose
110/111	126	Shrub swamp with perennial watercourse	Multiflora rose, winterberry, red maple, skunk cabbage, sensitive fern, sedges	Y Multiflora rose
111/112	127	Shrub swamp and shallow marsh with int. watercourse	Winterberry, multiflora rose, Japanese barberry, highbush blueberry, steeplebush, sedges, skunk cabbage, tussock sedge, Phragmites, cinnamon fern	Y Multiflora rose, Phragmites, barberry
112	128	Shrub swamp and shallow marsh with int. watercourse	Multiflora rose, winterberry, greenbrier, silky dogwood, sedges, sweet flag, soft rush, reed canary grass, jewelweed, lurid sedge, sensitive fern, iris, skunk cabbage	Y Multiflora rose, reed canary grass

Map Segment No. 1" = 100'	Wetland No. *	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
114	129 JCC-B	Deciduous wooded swamp and shrub swamp with int. and perennial watercourses	Red maple, ash, sugar maple, silky dogwood, multiflora rose, Japanese barberry, spicebush, skunk cabbage, jewelweed, false hellebore, Phragmites,	Y Multiflora rose, Phragmites, barberry
116	JCC-A1- A10	Deciduous swamp (off new ROW, on CL&P property))	Red maple, tulip, spicebush, multiflora rose, tatarian honeysuckle, arrowwood, violet, iris, jewelweed, sedges, skunk cabbage, grape	Y Multiflora rose
116	130	Shrub swamp (not on new ROW, along ROW to be transferred to JCC)	Multiflora rose, steeplebush, winterberry, reed canary grass, sensitive fern, soft rush, fox sedge	Y Multiflora rose, reed canary grass
117/118	131	Shrub swamp	Arrowwood, winterberry, multiflora rose, sedges, tussock sedge, skunk cabbage, cattail	Y Multiflora rose
118	132	Shrub swamp with perennial stream (Race Brook)	Arrowwood, multiflora rose, witch-hazel, steeplebush, silky dogwood, soft rush, skunk cabbage, sedges, sensitive fern, woolgrass, joe-pye-weed	Y Multiflora rose
119 - 122	133 (New ROW on B'Nai = wetland F)	Deciduous forested wetland on new ROW; otherwise shrub swamp and shallow marsh with Race Brook (AB)	Red maple, shagbark hickory, beech, oaks, spicebush, burning bush, beech, ironwood, multiflora rose, skunk cabbage, jewelweed, sedges, silky dogwood, steeplebush, winterberry, highbush blueberry, willow, arrowwood, swamp rose, alder, Phragmites, sedges, soft rush, cinnamon fern false hellebore, spike rush, tussock sedge, woolgrass, reed canary grass (uncommon)	Y Multiflora rose, Phragmites, reed canary grass
122	134	Shrub swamp with int. watercourse	Willow, multiflora rose, sedges	Y Multiflora rose
123	135	Shrub swamp and shallow marsh	Steeplebush, arrowwood, winterberry, multiflora rose, sedges, soft rush, cattail, skunk cabbage, jewelweed	Y Multiflora rose
124	136	Pond (no riparian vegetation)	Open water	N/A
124	137	Shrub swamp and shallow marsh	Arrowwood, silky dogwood, willow, multiflora rose, steeplebush, tussock sedge, skunk cabbage, cinnamon fern, cattail, jewelweed, sensitive fern, blue vervain	Y Multiflora rose
124/125	138	Shrub swamp and shallow marsh with perennial stream (Trib. to Race Brook) (AB)	Silky dogwood, arrowwood, winterberry, multiflora rose, swamp azalea, cattail, tussock sedge, skunk cabbage	Y Multiflora rose
126	139	Shrub swamp and shallow marsh (AB)	Arrowwood, multiflora rose, highbush blueberry, steeplebush, cattail, skunk cabbage, sedges, Phragmites, sensitive fern	Y Multiflora rose, Phragmites

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
127	140	Shrub swamp and shallow marsh with int. watercourse (AB)	Steeplebush, highbush blueberry, multiflora rose, winterberry, arrowwood, cattail, sedges, soft rush, woolgrass, Phragmites, skunk cabbage, cinnamon fern	Y Multiflora rose, Phragmites
127	141	Shrub swamp and shallow marsh with perennial watercourse (headwaters of Silver Brook)	Arrowwood, winterberry, multiflora rose, Japanese barberry, skunk cabbage, tussock sedge, sedges, cinnamon fern, blue vervain, Phragmites (uncommon)	Y Multiflora rose, Phragmites
127/128	142	Shallow marsh with int. watercourse	Steeplebush, arrowwood, multiflora rose, witch-hazel, cattails, tussock sedge, skunk cabbage	Y Multiflora rose
128	143	Shallow marsh and shrub swamp (AB)	Steeplebush, winterberry, willow, arrowwood, sedges, sensitive fern, soft rush, woolgrass	N
129/130	144	Shrub swamp adjacent to open water (Maltby Lake)	Highbush blueberry, willow, cinnamon fern, sedges	N
131	145A	Shrub swamp	Willow, multiflora rose, winterberry, sedges, skunk cabbage, cinnamon fern	Y Multiflora rose
131/132	146	Shallow marsh (AB)	Winterberry, steeplebush, arrowwood, tussock sedge, skunk cabbage, soft rush, sensitive fern, woolgrass	N
132	145B	Shallow marsh, shrub swamp	Red maple, arrowwood, winterberry, Phragmites, skunk cabbage, sedges, cinnamon fern, sensitive fern	Y Phragmites
133	147	Shallow marsh and shrub swamp with perennial watercourse	Arrowwood, winterberry, cattail, Phragmites, sedges, skunk cabbage, soft rush, reed canary grass	Y Phragmites, reed canary grass
134	148	Wet meadow and shallow marsh with a ponded watercourse (Silver Brook)	Soft rush, jewelweed, dock	N
135/136	149	Shallow marsh and shrub swamp with two small ponds (AB)	Arrowwood, steeplebush, soft rush, sedges, cinnamon fern, sensitive fern	N
137/138	150	Shrub swamp	Arrowwood, multiflora rose, silky dogwood, skunk cabbage, sedges, reed canary grass	Y Multiflora rose, reed canary grass
138	151	Shrub swamp and mowed lawn	Arrowwood, silky dogwood, multiflora rose, jewelweed	Y Multiflora rose

Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
138	152	Shrub swamp	Winterberry, multiflora rose, silky dogwood, arrowwood, jewelweed, sensitive fern, poison ivy	Y Multiflora rose
139	153	Shrub swamp and shallow marsh	Silky dogwood, greenbrier, elderberry, sedges, soft rush, jewelweed, goldenrod, joe-pye-weed	N
139	154	Wet meadow (disturbed) with int. watercourse	Grasses, soft rush, Phragmites (moderate)	Y Phragmites
140	155	Shallow marsh and shrub swamp with perennial watercourse (Indian River)	Multiflora rose, arrowwood, silky dogwood, steplebush, sedges, reed canary grass, skunk cabbage, joe-pye-weed, soft rush, jewelweed, purple loosestrife (uncommon)	Y Multiflora rose, reed canary grass, purple loosestrife
142	156	Shrub swamp	Silky dogwood, arrowwood, jewelweed, reed canary grass, sedges, skunk cabbage, blue vervain	Y Reed canary grass
142/143	157	Shrub swamp with perennial watercourse	Arrowwood, willow, cinnamon fern, sensitive fern, soft rush, sedges	N
143	158	Shrub swamp	Arrowwood, winterberry, swamp rose, willow, soft rush, cinnamon fern, sedges, skunk cabbage, woolgrass	N
143/144	159	Shrub swamp with int. watercourse	Arrowwood, willow, multiflora rose, sweet pepperbush, silky dogwood, skunk cabbage, sedges, goldenrod, Phragmites	Y Multiflora rose, Phragmites
144	160	Pond, mowed lawn, wetland vegetation	Pond	N/A
144/145	161	Shrub swamp and shallow marsh with perennial watercourse (Stubby Plains Brook)	Arrowwood, multiflora rose, elderberry, alder, red maple, tussock sedge, sedges, Phragmites	Y Multiflora rose, Phragmites
147	162	Shrub swamp and shallow marsh with perennial watercourse	Willow, multiflora rose, Phragmites, sensitive fern, jewelweed	Y Multiflora rose, Phragmites
147/148	163	Shrub swamp	Silky dogwood, arrowwood, sensitive fern, sedges, blue vervain, Phragmites	Y Phragmites
148	164	Shrub swamp, <b>Eisenhower Park</b>	Alder, willow, silky dogwood, sedges, jewelweed, soft rush, sensitive fern	N
148/149	165	Shallow marsh, <b>Eisenhower Park</b>	Willow, multiflora rose, red cedar, sedges, reedtop, soft rush, sensitive fern, cattail	Y Multiflora rose



Map Segment No. 1" = 100'	Wetland No.*	Wetland Type	Principal Vegetative Species	Invasive Species Currently Present (Y/N)
149	166	Shrub swamp, <b>Eisenhower Park</b>	Steeplebush, willow, alder, soft rush, sedges, blue vervain, goldenrod, water plantain	N
149-151	167	Shrub swamp with perennial watercourse (Wepawaug River), <b>Eisenhower Park (AB)</b>	Arrowwood, silky dogwood, alder, red raspberry, goldenrod, sedges, soft rush, sensitive fern, jewelweed	N
151	168	Shrub swamp and shallow marsh with int. watercourse (AB)	Willow, arrowwood, soft rush, sedges, jewelweed, cinnamon fern, boneset, Phragmites (scarce)	Y Phragmites (scarce)
152	169	Shrub swamp and shallow marsh with int. watercourse	Willow, silky dogwood, multiflora rose, tatarian honeysuckle, Phragmites, jewelweed, sedges, sensitive fern	Y Multiflora rose, Phragmites, honeysuckle
153/154	170	Shallow marsh	Arrowwood, silky dogwood, red raspberry, Phragmites (abundant), sensitive fern, jewelweed, skunk cabbage	Y Phragmites
155/156	171	Shrub swamp	Arrowwood, multiflora rose, silky dogwood, sedges, soft rush, sensitive fern, skunk cabbage	Y Multiflora rose

Notes:

1. Invasive wetland species are: *Phragmites* (common reed grass), purple loosestrife, tatarian honeysuckle, Japanese barberry, Japanese knotweed, buckthorn, multiflora rose, autumn olive, reed canary grass, privet (*Ligustrum*), and spurge.
2. The principal vegetation species listed for each wetland are taken from the results of wetland delineations (data forms) compiled by Soil Science and Environmental Services, Inc. during field investigations performed in 2002 – 2006. Species listed in this table are those identified by SSES as abundant – moderate density in each wetland. However, any occurrence of an invasive species is identified; invasive species are assumed to be either abundant – moderate density unless otherwise noted.

(AB) = Amphibian breeding.

\* = Wetland number identified on aerial map segments and in wetland reports.

## **APPENDIX C**

### **CL&P STANDARDS FOR INTEGRATED VEGETATION MANAGEMENT (IN UPLANDS AND WETLANDS) ON OVERHEAD ROWS**

# NORTHEAST UTILITIES SPECIFICATION FOR RIGHTS-OF-WAY VEGETATION MANAGEMENT

## SECTION III TECHNICAL REQUIREMENTS 2007

### I. Scope

This specification covers the selective vegetation control of targeted undesirable tree, brush and vine species on Northeast Utilities transmission and distribution rights-of-way. Management of undesirable vegetation will be performed through the integrated use of manual, mechanical, chemical or other means as may be available to eliminate identified target species and remove potentially conflicting trees or tree parts from contact with the overhead conductors and/or electric facilities.

### II. Objective

The primary purpose of rights-of-way vegetation control is to provide a clear and accessible area for the operation, review and maintenance of electric facilities located on the right-of-way. Reliability will be preserved through the removal of all potentially interfering tree, shrub and vine species that may, through normal growth, contact the overhead electric conductors or impede physical or visual access along the right-of-way. Vegetation species such as grasses, forbs, ferns and low growing shrubs are considered desirable and shall be preserved and encouraged to grow.

### III. General

#### A. Maintenance Zones

The type of maintenance will be dictated by voltage of the conductors and the average width of the right-of-way on each project. There are two types of maintenance, a two zone system for higher voltage classes and/or wider rights-of-way and a one-zone system for lower voltages and/or narrow rights-of-way. The voltage class will be defaulted to the highest voltage on the right-of-way if the right-of-way is shared by more than one circuit or line.

The two maintenance systems are as follows:

**Two Zone System:** for rights-of-way widths greater than 100 feet.

**One Zone System:** for rights-of-way 100 feet or less in width

#### 1. Two-Zone Maintenance

Management of vegetation within right-of-way boundaries shall be performed in accordance with the two-zone maintenance concept for transmission voltage lines and rights-of-way in excess of 100 feet in width.

A wire or conductor zone and a border or side zone shall be developed and maintained in accordance with these specifications.

**Wire Zone:** The wire zone shall include the area directly beneath the overhead conductors extending outward a distance of 15 feet from the outermost conductor(s).

**Side Zone:** The side zones shall include all areas from the 15-foot limit of the outermost conductor(s) to the edge of the right-of-way border or maintained area.

## 2. One-Zone Maintenance

Management of vegetation within right-of-way boundaries shall be performed for right-of-way widths of 100 feet and less. The entire width of the right-of-way is maintained as a Wire Zone in accordance with the management requirements listed under Section B.1..

### B. General Areas

General areas will include all rights-of-way where the company owns the land encompassed by the rights-of-way in fee, where easement rights do not restrict the preferred maintenance method(s), or where physical features do not require a maintenance practice different than the preferred method(s).

**1. Wire Zones:** Normally, all tree species and selected undesirable shrub species (state-listed invasive shrub species) regardless of height at the time of maintenance will be controlled. Also, desirable shrub species that are greater than 8 feet in height at the time of maintenance may be controlled depending on location and physical conditions within the right-of-way or position relative to facilities (ie. terrain or large clearances due to heights of the overhead conductors). Selected invasive species as listed below will be eliminated on all areas of the right-of-way regardless of height. All hardwood tree species will be treated standing or cut and treated if stems exceed 12 feet in height. All conifers less than 4 feet in height may be treated standing or cut, and all conifers taller than 4 feet in height shall be cut and diced. Cedar trees in excess of 8 feet generally will not be managed under this maintenance specification and the proper course of action for any cedar tree work will be noted in the Special Conditions (Section II). (See Appendix 1 for a partial listing of desirable shrubs)

**2. Side Zones:** Normally all tree species (except cedar trees) and listed invasive plant species will be controlled. All other shrub species regardless of height may remain where practical. (See Appendix 1 for a listing of the desirable species for side zones)

**Requirements for control may be modified to take into consideration topographical features such as valleys, gorges and steep slopes that result in large clearances from the overhead conductors, or where certain target species may be retained to provide barriers to the right-of-way or where visual aspects may limit the use of herbicides. These locations and modifications will be listed in Section II.**

**3. Invasive Species Control:** Invasive species to be controlled within the entire maintained areas include the following species:

Multiflora Rose	<i>Rosa multiflora</i>
Common Buckthorn	<i>Rhamnus cathartica</i>
Glossy Buckthorn	<i>Frangula alnus</i>
Autumn Olive	<i>Elaeagnus umbellate</i>
Russian Olive	<i>Elaeagnus augustifolia</i>
Japanese Barberry	<i>Berberis thunbergii</i>
Common Barberry	<i>Berberis vulgaris</i>

### C. Sensitive Areas

Sensitive areas are those areas where the preferred maintenance method used for general areas cannot be used and must be modified or altered to obtain the desired control. Sensitive areas shall include but are not limited to:

- Residential areas (yards)
- Public water supply watersheds
- Public or private well locations
- Stream or river crossings
- Wetlands (wet)
- No chemical areas

All target species identified in Section III. B. shall be controlled in these areas when possible. Herbicide applications may be performed unless the easement specifically restricts the use of chemicals. In areas where herbicide use is restricted or where herbicide use should be excluded, all target vegetation shall be cut and diced or chipped.

Within the sensitive areas, herbicide applications shall be restricted from the following areas:

**CONNECTICUT**

- Within 100 feet of a public water supply well
- Within 50 feet of a private well
- Within wet wetland areas (10 feet from standing water)
- Within 10 feet of a river, stream or other body of water

**MASSACHUSETTS**

- Within 400 feet of a public water supply well
- Within 100 feet of a public surface water supply
- Within 50 feet of a private well
- Within wet wetland areas (10 feet from standing water)
- Within 10 feet of a river, stream or other body of water
- Within 100 feet of habitated or agricultural land

**NEW HAMPSHIRE**

- Within public water supply watersheds without a state permit
- Within 50 feet of any public well
- Within 400 feet of a gravel packed well or 250 feet of a drilled well used for public water supply without a state permit
- Within 50 feet of a private well
- Within wet wetland areas (25 feet from standing water)
- Within 25 feet of a river, stream or other body of water

**D. Access and Structures**

Existing access roads along rights-of-way including existing access to structures shall be cleared of all woody vegetation and where practical and herbicide treated to a minimum width of 14 feet.

Structures shall be cleared of all woody vegetation (including vines) and where practical, herbicide treated to a radius of 15 feet around each structure.

Guys shall be cleared of all woody vegetation (including vines) and where practical, herbicide treated to a radius of 5 feet at the anchor location. All vegetation in contact with the guy wire shall be herbicide treated or cut and removed. **Vines in contact with structures or guy wires shall be cleared manually if the vines have grown to at least 25% of the height of the structure or guy wire and all cut stumps of vines treated with an approved cut-surface herbicide mixture. Vines less than 25% may be controlled using foliar applications if herbicide use is not restricted.**

All stumps resulting from the cutting or mowing of standing vegetation shall be as low as practical around structures, guys and access areas and shall not exceed 3 inches in height.

**IV. Maintenance Methods**

**A. Herbicide Applications**

All target vegetation may be chemically treated using one or more of the following methods:

- High Volume Foliar (Must be specifically listed in bid proposal and locations noted)
- Low Volume Foliar
- Ultra-low Volume Foliar
- Low Volume Basal
- Cut & Stump Treatments

Applications directly to soil or the ground as well as non-selective broadcast applications or high volume basal applications shall not be used on the Northeast Utilities system.

The following herbicide materials are approved for use on the Northeast Utilities system:

#### **FOLIAR APPLICATIONS**

- ESCORT\* High and low volume
- ARSENAL\* High and low volume
- VANQUISH High and low volume
- ACCORD\* High and low volume
- KRENITE S\* High and low volume

#### **BASAL APPLICATIONS**

- GARLON 4 Low volume basal
- STALKER Low volume basal

#### **CUT SURFACE APPLICATIONS**

- ACCORD\* (50/50 with water)
- STALKER (with water - use labeled rates)
- ARSENAL\* (with water - use labeled rates)
- KRENITE S\* (50/50 with water)
- PATHWAY
- GARLON 4# (in basal oil - use labeled rates)
- PATHFINDER

\* Sensitive area approved herbicide for Massachusetts

# Sensitive area approved herbicide for Massachusetts - application by sponge only

Foliar applications may employ a mixture containing two or more of the approved materials listed above. Basal applications shall employ a diluent labeled and approved for basal oil applications.

### **B. Manual Cutting**

Manual cutting shall be employed when target stems exceed 12 feet in height or in sensitive areas where foliar or basal applications are not acceptable. All stumps resulting from the cutting of hardwood trees and shrub species including pitch pine shall be treated with an approved cut-surface herbicide where allowed. All stumps shall be less than 3 inches in height and all slash shall be wind-rowed along the right-of-way edge or diced in general areas. In sensitive areas, slash shall be diced, chipped or removed from the right-of-way depending on the physical locations.

Cut cherry trees in active pasture areas will be removed from the pasture immediately after cutting during the growing season and diced in an appropriate area of the right-of-way outside of the active pastures. NOTE: wilted cherry leaves are highly toxic to most livestock.

Diced or piled slash shall not be left within access areas or within the cleared areas around structures and guys. Slash and debris shall also be kept out of water courses, stream and river banks and bodies of water including standing water in wetland areas.

Trees or tree branches that are in close proximity to the conductors or are visibly damaged, dead or diseased and pose a threat to the conductors will be identified as "danger trees" and will be cut and/or removed when required by the Owner's Representative.

### **C. Mechanical Mowing**

Mowing may be performed when necessary to reduce the heights of large dense stands of undesirable vegetation in preparation for an herbicide application or where herbicide applications are restricted. Mowing shall be selective in that large patches of low-growing desirable vegetation shall be retained where practical. Mowing shall be limited to wire zone areas, for access roads along the rights-of-way, or around structures and

guys. However, limited mowing of side zones may be allowed to reduce dense stands of target vegetation. Mowing may only be performed after the review and approval of the Owner's Representative. Except in no-chemical areas, mowing shall be followed up with an herbicide application to the target stumps or resprouts.

The resulting stubble from mowing operations shall be as low as practical depending on the densities and terrain.

For Connecticut and Massachusetts projects, mowing shall be restricted to the dormant season only from September 1st to March 31st.

#### D. Tree Trimming

When required, trimming alongside the conductors shall be performed so that all branches to be removed are cut back to the edge of the right-of-way or main trunk depending on easement restrictions and property owner consent to trim beyond the right-of-way edge.

All trimming shall be performed to allow for the following clearances between the vegetation and the conductors:

Voltage Class	Minimum Side Clearance	Minimum Under-Clearance
<230kV	20 feet	11 feet
230kV	30 feet	15 feet
345kV	30 feet	15 feet

All trimming shall be performed in accordance with proper arboricultural practices (i.e. ANSI A-300). If trimming alone cannot provide the minimum clearances listed – efforts shall be made to remove the offending trees or vegetation.

#### V. Skilled Contractor Personnel

The contractor shall employ supervisory and field personnel who are thoroughly trained in selective woody vegetation control techniques including all methods and materials to perform the work as specified. **The ability to recognize and identify desirable and undesirable species is mandatory for all vegetation control personnel.** All persons applying herbicides shall possess a valid applicator's license or supervisory certification for the state in which herbicides are being applied. All contract employees shall perform work in accordance with regulations listed under OSHA 29 CFR 1910.269. Trimming shall be performed by personnel certified to perform this work and in accordance with ANSI Z-133.1.1994. Trimming shall comply with standards listed under ANSI A-300.

The contractor is required to know and understand all laws and regulations pertaining to the control of vegetation on right-of-ways, the use of herbicides and any restrictions to herbicide use for each state in which they are performing right-of-way vegetation control.

#### VI. Property Owner Notification

The contractor shall inform property owners and right-of-way abutters with homes or buildings located within 200 feet of the right-of-way or with maintained property to the edge of the right-of-way or within the right-of-way area, of the proposed work at least 7 days prior to the commencement of work. Personal contact or notification by a door hanger is required. The contractor shall also keep a listing of the contacts made and provide this list to the Owner's Representative at the completion of the project, or upon request by the Owner's Representative during the course of the project.

Notification may be made by personal visit, phone contact or use of a Company-approved door hanger. When door hangers are used, the Contractor will provide the contact name and a phone number for both the contractor and the Owner's Representative handling the project.

The contractor shall note the name of the person contacted when notification is made in-person or through a phone contact on the approved NU notification log. All notification logs must be presented to the Owner's Representative at the completion of the notification process on each project or upon request if the notifications are underway.

The contractor shall use a toll-free number on all door hangers for property-owner inquiries.

**NOTE: For all touch-up applications, property owner notification must again be performed in the year the application is to be made in advance (at least 7 days) of the work.**

## VII. Environmental

All work performed under the rights-of-way brush control program will comply with all pertinent state statutes and federal regulations regarding herbicide use and applications. It is the Company's position that strict compliance with the principles of selective vegetation control and the identification and preservation of listed desirable species will be required. To be environmentally compliant, all crews shall be trained in the proper methods and use of herbicide application techniques being used. Low-volume and low pressure application methods are preferred. Proposals to employ high-volume/high pressure applications must be made at the time the bid proposal is submitted and will only be allowed after review and approval of the Owner's Representative.

All crew personnel shall be trained and knowledgeable in the proper actions for oil and pesticide spill containment and cleanup. All vehicles shall possess containment and cleanup equipment and materials at all times while performing this contract. All spills will be reported to the Owner's Representative in accordance with the procedure listed under Section VIII, E. Problems and Complaints (below) and all state and federal agencies shall be notified if any spill meets the requirements for reporting for these agencies.

Failure to adhere to the requirements of this section may result in contract suspension or cancellation.

## VIII. Miscellaneous

### A. Changes to Contract Requirements

In the event changes are requested in any portion of the contract such as delaying cutting to a period outside of the normal prep-cutting period or to request mowing in place of manual prep-cutting, the contractor must first request such modifications in writing to the Supervisor – Transmission Vegetation Management. All requests for modifications must be made well in advance of the need for the proposed modification. Any requested modifications must state a reason as to why the revision is necessary and is in the best interest of the contractor's and NU's needs. Modifications can only be implemented upon a written approval from the Supervisor – Transmission Vegetation Management.

### B. Preparatory Cutting and Patrols

In order to ensure that there are no potential tree/conductor problems during the course of the maintenance period and prior to the completion of all work, it shall be necessary for the contractor to perform a complete patrol of all areas to review and identify any potential tree problems. **Contractors shall use the form provided by NU for listing problem areas to be reviewed by the Owner's Representatives (Appendix 2).**

**The patrol and danger tree identification shall be completed before April 1<sup>st</sup> of each year. Also, all cutting - selective cutting areas, structure and access clearing and the cutting of vegetation in excess of 12 feet in height shall be performed and completed before June 1<sup>st</sup> of each year.**

### C. Access for Rights-of-Ways

The Company will provide information on the appropriate access points to rights-of-way where they exist. The Company will supply keys for all Company locked gates that will be returned to the Owner's Representative upon completion of the contract. The contractor shall be responsible for obtaining landowner permission to use



any other access points not designated by the company. Access along rights-of-way shall not cause harm or damage to any private or company property or fixtures.

#### **D. In-Lieu-Of Agreements**

At easement locations where the property owner has refused the use of herbicides or the removal of potentially interfering target species, the Owner's Representative will obtain an in-lieu-of agreement for the property owner to maintain the right-of-way area in a manner that is approved and accepted by the Company. If a property owner refuses to allow the performance of the work as specified, the contractor shall inform the Owner's Representative immediately for resolution.

#### **D. Work Periods**

Work shall normally be performed during the company's normal work period - weekdays 7:30 am to 4:30 pm unless prior approval has been obtained from the Owner's Representative. There will be no work performed on weekends or company observed holidays unless prior approval is obtained from the Owner's Representative.

#### **E. Problems and Complaints**

The contractor shall immediately inform the Owner's Representative of any problems or complaints received from property-owner's, abutters or town or state officials that develop during the course of the work.

The contractor shall also immediately notify the Owner's Representative of any incidents involving:

- Electric interruptions
- Electrical contacts by employees
- Employee accidents or injuries (non-electrical)
- Damage to NU equipment or property
- Damage to private property
- Herbicide or oil spills

Completion of the Contractor Incident Report Form (Appendix 5) is required on all recordable incidents listed above.

The Contractor is responsible for any repairs to Company or private property damaged during the course of the work.

In accordance with TD 916, the Owner's Representative shall document the incident in the contractor's work file.

#### **F. Weekly Reports**

Northeast Utilities Weekly Transmission Brush Control or Tree Work Report (form OP3368 - Appendix 3 shall be completed daily and submitted to the Owner's Representative weekly. The report shall be complete and provide all information relative to the project including the line or project numbers(s) all labor and equipment hours, amounts of herbicide mixtures and materials used, amount of area treated, location of areas treated (by structure number, road crossing or substation) and the number of trees removed or linear feet of trimming along the right-of-way edge. NOTE: only one form required per right-of-way project.

Contractor Supervision shall sign and date all completed time sheets and submit to the Owner's Representative by Tuesday of the week following the ending date on the time sheet. The Owner's Representative shall review and approve time sheet information and sign and date the time sheet verifying work is completed as required and all time sheet information is accurate.

#### **G. Pesticide Application Records**

Contractors are required to adhere to all state pesticide laws regarding the completion and retention of daily

pesticide application records for all herbicide applications. These records may be requested by NU if and when issues regarding applications are required.

#### **H. Project Summary Reports**

The contractor shall submit summary information on the Northeast Utilities System Rights-of-Way Herbicide Application Summary Report form (Appendix 4) for each project worked that year. This includes the general maintenance year as well as the touch-up performed in subsequent years.

Information required on this form includes the total acreage treated using the various application methods and materials as well as the total volumes of herbicide mixtures applied, the total amounts of each individual herbicide product applied (along with corresponding acreage) and the total amounts of basal oil diluents used. The summary report shall also list the total man hours, man-days and calendar days required to complete the project. A man-day is considered an 8-hour day.

**All Project Summary Reports are due before December 31<sup>st</sup> of the year in which the project was performed.**

2007 Rights-of-Way Section III.doc

## APPENDIX 1

### WOODY SPECIES ALLOWED TO REMAIN IN CONDUCTOR ZONE: (PARTIAL LIST)

<u>COMMON NAME</u>	<u>GENUS/SPECIES</u>
Arrowwood	<i>Viburnum dentatum</i>
Bayberry	<i>Myrica pennsylvanica</i>
Blueberry - Highbush *	<i>Vaccinium corymbosum</i>
Blueberry - Lowbush	<i>Vaccinium angustifolium</i> & <i>V. vacillans</i>
Brambles	<i>Rubus spp.</i>
Buttonbush	<i>Cephalanthus occidentalis</i>
Dogwood - Gray	<i>Cornus racemosa</i>
Dogwood - Redosier	<i>Cornus stolonifera</i>
Dogwood - Silky	<i>Cornus amomum</i>
Elderberry	<i>Sambucus spp.</i>
Hazelnut	<i>Corylus americana</i> & <i>C. cornuta</i>
Honeysuckle - Bush	<i>Diervilla lonicera</i>
Honeysuckle - Fly	<i>Lonicera canadensis</i>
Honeysuckle - Tartarian	<i>Lonicera tatarica</i>
Huckleberry	<i>Gaylussacia spp.</i>
Maple-leaf Viburnum	<i>Viburnum acerifolium</i>
Meadowsweet - Broad-leaved	<i>Spirea latifolia</i>
Meadowsweet - Narrow-leaved	<i>Spirea alba</i>
Mountain Laurel *	<i>Kalmia spp.</i>
Oblong Fruited Juneberry	<i>Amelanchier bartramiana</i>
Oldfield Common Juniper	<i>Juniperus depressa</i>
Pasture Juniper	<i>Juniperis communis</i>
Running Shadbush	<i>Amelanchier stolonifera</i>
Sheeplaurel	<i>Kalamia augustifolia</i>
Spicebush	<i>Lindera benzoin</i>
Steeplebush	<i>Spirea tomentosa</i>
Sweetfern	<i>Comptonia peregrina</i>
Sweetpepperbush	<i>Clethra alnifolia</i>
Winterberry	<i>Ilex verticillata</i>
Witch Hobble	<i>Viburnum alnifolium</i>
Witherod	<i>Viburnum cassinoides</i>

\* Normally will not be treated or removed regardless of height

### SPECIES ALLOWED TO REMAIN IN THE SIDE ZONES: (PARTIAL LIST)

#### All species listed above including:

Alder	<i>Alnus spp.</i>
Hornbeam	<i>Carpinus betulus</i>
Dogwood - Alternate-leaved	<i>Cornus alternifolia</i>
Dogwood - Flowering	<i>Cornus florida</i>
Hornbeam	<i>Carpinus caroliniana</i>
Sumac - Shining	<i>Rhus copillina</i>
Sumac - Smooth	<i>Rhus glabra</i>
Sumac - Staghorn	<i>Rhus typhina</i>
Willows (except tree species)	<i>Salix spp.</i>
Witch-Hazel	<i>Hamamelis virginiana</i>







**APPENDIX 5**

**NORTHEAST UTILITIES  
DISTRIBUTION LINE CLEARANCE  
INCIDENT REPORT**

District: \_\_\_\_\_ Date of Incident: \_\_\_\_\_

Time of Incident: \_\_\_\_\_ Contractor: \_\_\_\_\_

Foreman: \_\_\_\_\_ Person Involved in Incident: \_\_\_\_\_

Town: \_\_\_\_\_

Street: \_\_\_\_\_ Pole No.: \_\_\_\_\_

**Nature of Incident:**

- Electrical Contact
- Employee Injury (non electrical)
- Vehicle Accident
- Property Damage
- Electrical Interruption
- OIL Spill
- Pesticide Spill

Interruption No.: \_\_\_\_\_ Circuit: \_\_\_\_\_ Voltage: \_\_\_\_\_

No. Customers Interrupted: \_\_\_\_\_ Contractor Charges: \_\_\_\_\_

**Incident Description:**

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**Follow Up Action Taken With Contractor:**

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Reviewed By: Arborist: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor: \_\_\_\_\_ Date: \_\_\_\_\_