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Invasive Removal and Control 38 and 58 Railroad St

The purpose of this document is to provide a detailed invasive mitigation program for the project at 38 and 58 Railroad St in Haverhill, MA. This program will be used to improve the riverfront and bank on site while being sensitive to the existing functions provided by the invasive plants that currently dominate the area (estimated >75% of vegetative coverage). Additionally, vegetation that poses a risk to the revetment which was installed to protect the City sewer main that runs underneath will be removed and native plants that provide stabilization, shade and habitat will be installed. The ultimate goal of the project is to re-establish and maintain a health native plant community that includes tree, shrub and herbaceous vegetation, in a phased manner that does not remove all function at once.

The slope along the river will be divided up into 10-foot increments. The protocol below will be followed at every third increment along the riverfront in the first year. By the end of the first year of treatment, 1/3 of the riverfront will have been treated and native plantings installed. The remaining riverfront (outside of grading areas and areas currently otherwise developed) will be left intact. In the second year, prior treatment areas will be maintained and the next increment series will be followed. In the final year of treatment/management the remaining riverfront mitigation area will be treated and planted.

The exception to the above phased approach is that that control of all invasive vines that are growing up into tree canopies will be conducted in the first year. The purpose of this is to stop the ongoing damage and evaluate the opportunity for the existing trees located landward of the revetment to recover. After vines are treated, the applicant will mark trees that appear to be in such poor condition that they are not likely to recover. These trees will not be removed without the concurrence of the Haverhill Conservation Agent.

In addition to invasive plants, any trees within the revetment that pose a risk to the sewer line due to their roots or to the revetment that protects the sewer line if they were to fall will be cut flush and the stumps treated using the invasive protocols below. Native plants as shown on the landscape plan will go in their place. Additionally native plants that are so damaged as to be unlikely to recover due to the invasive growth will be replaced with plants as shown on the plan. Root systems will be left in place. All plantings within the revetment will be installed within the voids between the stones.

Species identified on site by the project team or likely to be present based on observations by others are listed below:

Invasive Trees

Norway maple (*Acer platanoides*)

Black locust *Robinia pseudoacacia*

Invasive Vines

Oriental Bittersweet (*Celastrus orbiculatus*)

Multi-flora Rose (*Rosa multiflora*)

Invasive Shrubs

Shrub Honeysuckle (*Lonicera morrowii* & *bella*)

Multi-flora Rose (*Rosa multiflora*)

Winged Euonymus (*Euonymus alatus*)

Common Buckthorn (*Rhamnus cathartica*) and Glossy Buckthorn (*Frangula alnus*)

Japanese Barberry (*Berberis thunbergii*)

Herbaceous/Soft Stemmed

Japanese knotweed (*Polygonum cuspidatum*).

Overview

As part of the project, the project will generally use the approaches outlined below. Specifics of the techniques to be used are detailed further in this document. Note all herbicides used must be in their aquatic safe formulations. Any products used as additives for treatment should also be approved for use in or near wetlands. A "blue foaming surfactant" may be used in dry conditions (low tide cycle) above the mean high water line to improve adhesion and absorption to the treated plants.

Shrubs and Trees

Trees will be killed by cutting in to the bark and applying an aquatic safe, Triclopyr based herbicide, such as renovate 3. The technique to be used to cut into the bark is called Frilling, where the girdling of the tree is done with downward cuts. This allows better retention and absorption of herbicides. After sufficient monitoring and retreatment as necessary, trees will be removed and cut flush with roots and stumps to remain.

Shrubs and saplings will be treated in a similar manner through either frilling for larger diameter plants or a method known as hack and squirt, where downward cuts are made in the plant and herbicide applied. Once they are confirmed dead, they will be either removed or left in place as habitat when they are in an area where there are sufficient native plants to grow into the area as the dead plant decays. Note that in areas where invasive shrubs form a monoculture and there is minimal risk of non-target native plants, a foliar application may be substituted for the more selective direct application. Additionally, singular plants or smaller stemmed plants may also be treated with the bloody glove method. A weed wrench may also be used on smaller saplings and shrubs under 1 inch in diameter provided they can be pulled without significant soil disturbance. The goal is to kill the invasive plants efficiently and effectively without doing harm to native, non-target plants.

Note that a contractor may substitute a cut stump method for frilling and the hack and squirt method, but additional care must be taken to monitor the surrounding area for root sprouting.

Herbaceous/Soft Stemmed Plants

Knotweed will be treated with one of two aquatic safe herbicides: Habitat, which is an Imazapyr based herbicide, or Rodeo which is a glyphosate-based herbicide. Where the plants represent a dense monoculture, limited foliar application methodologies can be used. In areas where the plants are intermixed with non-target species the bloody glove method or stem injection will be employed.

The remaining herbaceous plants may be treated by the contractor with Rodeo or Habitat using the bloody glove or foliar application methods (foliar application only when there are no non-target species present).. Note that herbicide application must be done by a licensed applicator and must comply with label instructions.

The following are species specific notes. Each species description below has some tailored notes regarding methodologies and then refers to which methods at the end of the document are appropriate for control.

Invasive Species Removal Methodology Overview

A wetland scientist, botanist or other professional with a thorough understanding of the identification and methodology of invasive plants will go over the methodology with the contractor and assist with plant identification as needed. It is important to work on one manageable area at a time, otherwise our experience has been that plants are missed. Focus on no more than one 10 foot segment at a time working from top of slope to the bottom or vice versa. After treatment and confirmation that plants are dead, all material removed must be handled with care and disposed of in a manner that renders seeds, stems, and roots non-viable. Generally woody plants without seed stock (berries or fruit) may be chipped. Herbaceous material without seeds may be bagged or composted. Knotweed that has not been treated may be used for animal food. Herbaceous material with seeds should be bagged. Woody material with seeds/berries should be burned or chipped with chips composted offsite or used as fuel at a biomass facility.

All herbicide application will use marking dyes. Since these dyes only indicate treated areas for a short duration, plants likely to require retreatment will be further identified with a field marking paint after treatment. The herbicides to be used are the aquatic safe versions of glyphosate (such as Rodeo) imazapyr (such as Habitat) and triclopyr (such as Renovate 3). Note that application of herbicides to herbaceous plants should be done during the growing season, and is most effective from June through September. Triclopyr can be applied to woody vegetation year-round, but is most effective in June through September. These herbicides should be applied by a Massachusetts Certified applicator. The recommendation is to use the triclopyr on woody vegetation and imazapyr on herbaceous plants.

Method 1. Foliar spray.

This method is only appropriate for areas where the invasive population represents >90% of the vegetative community. Using a low pressure backpack sprayer with the nozzle set so there is minimal overspray apply the herbicide on plant foliage. An example of an areas

suitable for this approach is the stand of Japanese knotweed at the Coniston Entrance. In all instances care must be taken to avoid any impacts to non-target non-invasive plants.

Method 2. Bloody Glove.

When a plant cannot be pulled, the plant is too small to use a hack and squirt or frilling treatment, or a foliar application is otherwise necessary but the target plant is near non-target plants the bloody glove method is used for foliar application. This method uses a thick cotton glove placed over a rubber glove. The outer glove is saturated with herbicide and used to apply the herbicide directly to the plant leaves. This method is to be used on regrowth and plants smaller than ½ inch that cannot be pulled without breaking the roots. This method is also appropriate for smaller sprouting knotweed plants or for Phragmites. An aquatic safe formulation of Triclopyr is to be used on woody plants and either the aquatic safe formulation of glyphosate or imazapyr are to be used for soft stem plants such as knotweed and phragmites.

Method 3. Stem Injection

This method, for knotweed and phragmites involves injecting into the stem as low as possible onto the plant. For knotweed, generally try to inject below the bottom joint. For phragmites cut the stem and inject down the hollow center as low on the plant as can be reasonably achieved without injecting under standing water. An aquatic safe formulation glyphosate or imazapyr is to be used for stem injection.

Method 4. Hack and Squirt.

This method involves using a chainsaw, machete, hatchet or other appropriate tool to make downward cuts into a woody stem plant towards the bottom of the plant. Triclopyr is applied into the cut using a sponge brush or a sponge tip on a backpack sprayer. This method is to be used on all shrubs and saplings under 2 inches in diameter. Many plants scar up quickly, preventing the absorption of herbicide, so treatment should follow the hacking cut quickly.

Method 5. Cut Stump.

The cut stump method may be substituted for hack and squirt or frilling where a cut stump at 6 to 12 inches is treated directly with herbicide. The stump must be clearly marked with ribbon or marking paint after treatment and follow up treatment applied by making a fresh cut at least 1 inch below the original cut after two weeks. A caution regarding this method: marking of treated plants is critical and monitoring must evaluate new growth on the stump as well as root sprouting. If the stump is not clearly marked after treatment, new sprouts may be missed during monitoring and the stump may regrow in subsequent years.

Method 6. Frilling.

For trees over 2 inches in diameter, downward cuts are used to girdle the plant. Essentially it is the same approach as the hack and squirt method, but the entire circumference of the plant needs to be cut and treated. It is important to make the cut in the bark within the bottom 2 feet of the plant and treated in the cut with herbicide directly afterwards. Many plants scar up quickly, preventing the absorption of herbicide.

Method 7. Pulling in combination with herbicide

Smaller stems, typically ½” and smaller (see species specific notes above), may be pulled by hand or using a puller, such as a weed wrench or similar device. Any roots that break off should be treated if possible with triclopyr.

The above methods require a licensed pesticide applicator. Monitor all of the above methods for mortality after two weeks. Retreat using fresh cuts or injections using the appropriate method above and repeat until the plant has died. Once the plant has been confirmed to have died completely cut and remove the dead plant material (or leave in place to decompose). Treatment can be done year round, but is generally most effective in June/July through September/October. By favoring treatments that leave plants standing until confirmed dead, re-sprouting in the subsequent growing season will be dramatically reduced.

Method 8. Pulling of herbaceous material

Carefully pulling from the base of the plant trying to get as much root as possible. Any plant where seeds or bulblets have started to form should be bagged immediately. (Without seed, plants like garlic mustard can be composted).

Method 9. Pulling of woody plants.

Smaller stems, typically ½” and smaller (see species specific notes above), may be pulled by hand. Plants larger than ½” up through 1 ½” can be pulled using a puller, such as a weed wrench or similar device. Tamp down soils with your foot after pulling to avoid creating an erosion issue. Larger areas may need to be mulched with straw or covered with jute as directed by the wetland scientist or environmental monitor.

Note it is critical when using physical methods that disturb soil to stabilize the area of disturbance right away so as to not create a new environmental problem while trying to solve another. For areas where a monoculture is removed, use of native seed, seedlings, or native tubelings in conjunction with mulch from leaf litter, straw or salt marsh hay can minimize any adverse impacts.

Disposal:

Any live plants removed as part of invasive removal or site grading need to be handled carefully. Small pieces of plants and roots can sprout to form new plants. All plants removed plants should be stored and disposed in a manner that prevents spreading of invasive species and in accordance with applicable laws.

Methodology: If not using herbicide, follow non-treatment related steps.

1. Mark outer limits of removal area
2. Mark example invasives and review with contractor

3. Contractors should review methodologies for treatment with wetland scientist, botanist, or other knowledgeable person familiar with invasive treatment and removal.
4. Working in 10 foot sections, treat areas per methods above or pull plants per methods above. Do not attempt to pull knotweed unless plants are very small. Pull smaller plants unless using bloody glove method. Remove pulled plants from area for proper disposal or to store for burning with appropriate permits.
 - a. Invasive species shall only be disposed of in a manner that renders them nonliving and nonviable.
 - b. Plants should be burned, bagged or chipped as noted above. After chipping, plants may be used for trail surfacing, composted on site or removed from site for off-site composting, use as biomass fuel, etc...
 - c. Ensure that any plants with viable seeds are transported to the chipper, pile, or truck in tarps to avoid spreading seeds.
 - d. Do not pull bittersweet from native vegetation that it is wrapped around. Bittersweet vines entangled in vegetation should be pruned out of vegetation or left in place to dry up.
5. Pull all smaller invasives stems, using weed wrench or equivalent
 - a. Multi-stem trunks or black locust (if present) may need additional hand grubbing to try to remove as much root as possible or to remove if the weed wrench can not fit on the trunk.
 - b. Do not attempt to pull stems where there is any risk of destabilizing the soil (ie: extensive root system) near any wetland area.
 - c. It is important to get the entire root for plants that treated in advance using herbicide. Use professional judgement in determining if roots are so entangled as to not make removal possible. In those cases, leave stump in place.
6. Move on to the next section.
 - a. Multiple teams may work on separate sections concurrently.
 - b. Bark scarring may be occurring in one section, removal and/or treatment occurs in the prior sections (be careful to only treat fresh cuts with herbicide).
7. Evaluate areas for stabilization needs based on density of remaining native plants. Stabilization will be based on the remaining native plants. The goal is to have native woody plants throughout the area with plants in every void between revetment stones and the areas landward of the revetment planted per the landscape plan. Stabilization will include one of the following methods (or in some cases a combination)
 - a. Re-vegetated areas with approved native plants.
 - b. Spreading of straw mulch or installing jute any disturbed soils.

Follow up after treatment:

1. After 2 weeks, evaluate site for invasive plants and re-mark all remaining invasives with survey marking paint (bright pink or orange).
2. Re-treat with herbicide or pull using the same steps as above as soon as possible after inspection.

Plantings

Plants for the initial project are depicted on the project plans.

Species Specific Notes:

Invasive Trees:

1. **Norway maple** (*Acer platanoides*) is present on site and even when removed it will likely recur as saplings over time. Norway maples outcompete local plants by developing an early and dense canopy. Additionally, some research suggests that the decomposing leaves from Norway Maples have allelopathic properties that inhibit the growth of other plants. Norway Maples are easily identified during the growing season by the milky sap present when you break a leaf stem. The leaves are generally wider than that of other maples, and the bark is smoother. It is important to note that Norway Maples can both root and stump sprout when cut. Use method 2 and method 3 for smaller sprouting plants.
2. **Black locust.** Black locust has been found along the banks of the Merrimack elsewhere. It has not been identified on site but is included in case it is encountered now or in the future.

Invasive Vines

3. **Oriental Bittersweet** (*Celastrus orbiculatus*) has been observed on site. Note that cut vines are not to be pulled from native trees or shrubs that they are entangled in. Vines should be pruned out as much as possible within reach, with the remaining vines left to dry out and fall on their own. Control involves a combination of pulling smaller stems that are too small for effective herbicide treatment and cut bark stem treatment of larger stems. See method 2 and method 3 for smaller sprouting plants.

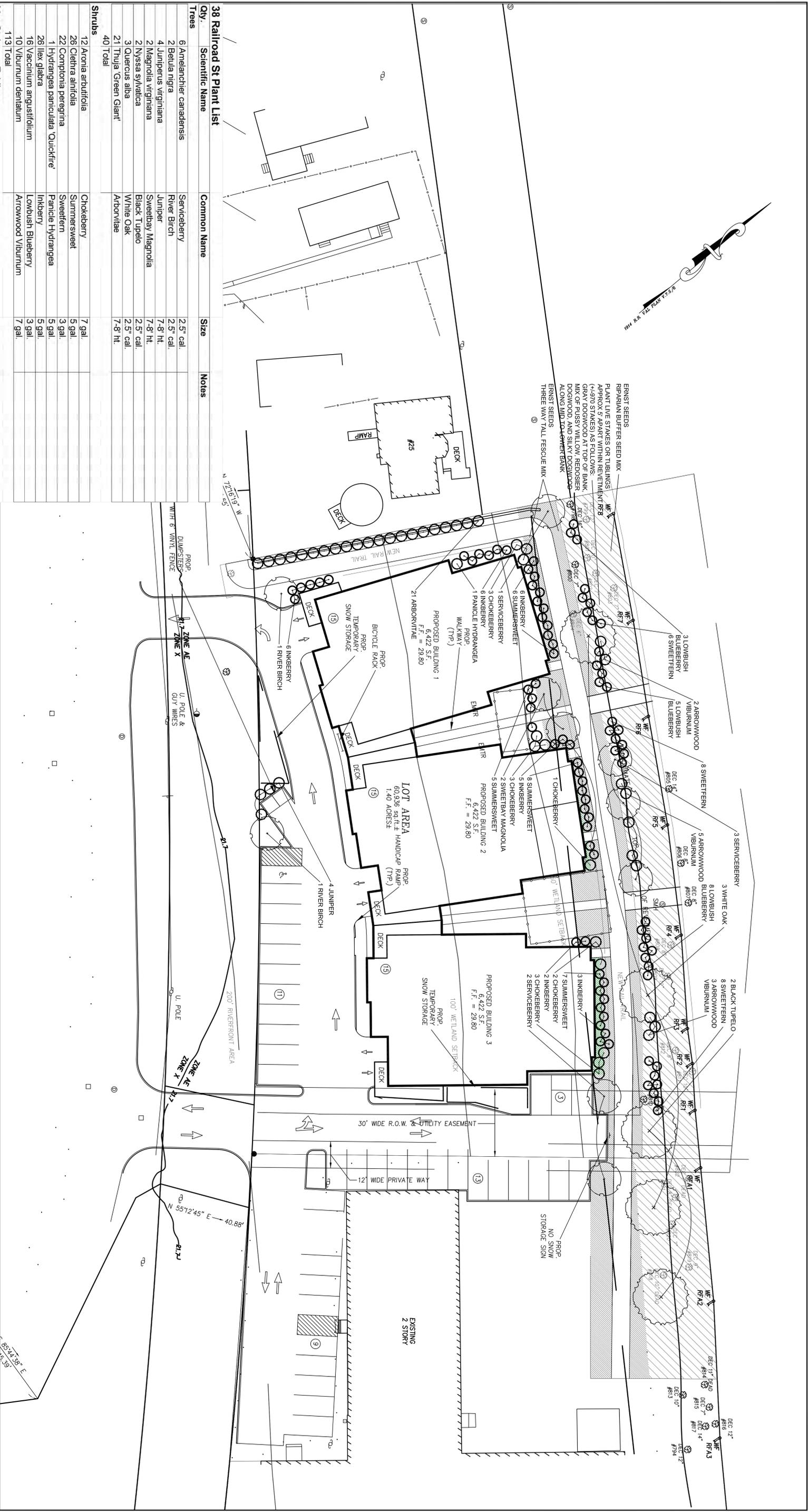
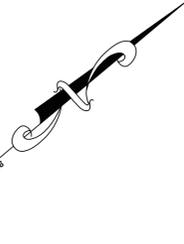
Invasive Shrubs

4. **Shrub Honeysuckle** (*Lonicera morrowii* & *bella*) has been observed on site. Herbicide application can be very effective in controlling populations, although pulling is preferred for standalone plants that are not part of larger clusters of invasive plants. Plants up to 1" in diameter can be successfully pulled using a weed wrench or similar. Roots that cannot be removed may be treated.
5. **Multi-flora Rose** (*Rosa multiflora*) has been observed on site. In order to hack and squirt, plants may need to be cut back to get to the main stem. Similar to honeysuckle, plants between ½" and 1 1/2" in diameter at the base can be successfully removed with a weed wrench or similar. This is most successful by carefully pruning the plant back to access the base of the plant. It is ideal to treat any roots that cannot be removed or monitor the area of pulled plants for regrowth.

6. **Winged Euonymus** (*Euonymus alatus*) has been observed on site. It is also known as Burning Bush was a popular ornamental shrub to plant in the landscape because of its brilliant red fall foliage.
7. **Common Buckthorn** (*Rhamnus cathartica*) and **Glossy Buckthorn** (*Frangula alnus*) have been observed on site. While buckthorn is easily pulled when smaller than 2 inches in diameter using a weed wrench, you must get all the roots or resprouting will likely occur. Herbicide treatment is difficult on seedlings, which should be pulled..
8. **Japanese Barberry** (*Berberis thunbergii*) has been observed on site. Was a popular ornamental shrub due in part to its berries and deer resistance. Recent research has provided some indication that barberry can be home to a larger population of adult deer ticks and may play a role in increasing the spread of Lyme disease. Use method 2 and method 3 for smaller sprouting plants

Invasive Herbaceous/Soft Stemmed

9. **Japanese knotweed** (*Polygonum cuspidatum*). Knotweed is an aggressive, invasive plant that is difficult to eradicate. Cut pieces of the plant can root and the plant rapidly regrows from the extensive root system that establishes fairly quickly once a growth becomes established. The most effective way to eradicate knotweed is by treating fresh growth. This can be done in the spring after removing dead stems from the prior year or later in the growing season by performing a cut and treating new growth. Foliar application or stem injection are both effective, although a drill may be needed for stem injection on larger plants. Effective treatment requires persistent follow up with monitoring and retreatment to continually reduce the stand. Cutting knotweed may be effective over a long period of time if the removed plant material is well contained and properly disposed of. As noted above, the best approach to control is through a combination of cutting and herbicide application. A late spring/early summer treatment followed by an early fall re-treatment is typically needed. Several years of treatment may be needed for well-established populations.



Qty.	Scientific Name	Common Name	Size	Notes
38 Railroad St Plant List				
Trees				
6	Ametanctier canadensis	Serviceberry	2.5" cal	
2	Betula nigra	River Birch	2.5" cal	
4	Juniperus virginiana	Juniper	7-8' ht.	
2	Magnolia virginiana	Sweetbay Magnolia	7-8' ht.	
2	Nyssa sylvatica	Black Tupelo	2.5" cal	
3	Quercus alba	White Oak	2.5" cal	
21	Thuja Green Giant'	Arborvitae	7-8' ht.	
40	Total			
Shrubs				
12	Aronia arbutifolia	Chokeberry	7 gal	
26	Clethra alnifolia	Summersweet	5 gal	
22	Comptonia peregrina	Sweetfern	3 gal	
1	Hydrangea paniculata 'Quickfire'	Panicle Hydrangea	5 gal	
26	Ilex glabra	Inkberry	5 gal	
16	Vaccinium angustifolium	Lowbush Blueberry	3 gal	
10	Viburnum dentatum	Arrowwood Viburnum	7 gal	
113	Total			
Live Stakes or Tubulings				
215	Cornus amomum	Silky Dogwood	live stakes or tubulings	
325	Cornus racemosa	Grey Dogwood	live stakes or tubulings	
215	Cornus sericea	Redosier Dogwood	live stakes or tubulings	
215	Salix discolor	Pussy Willow	live stakes or tubulings	
Seed Mix				
	Riparian Buffer Seed Mix	Ernst Seeds	9000 sf of coverage at manufacturers req rate	
	Three Way Tall Fescue Mix	Ernst Seeds	4700 sf of coverage at manufacturers req rate	

Notes:

1. Remove most of the vegetation within the revegetment, along the entire length of the bank, with the exception of native shrubs and perennials and immediately replace with plant material, live stakes, and seed as shown.
2. Execute phased control of invasive plant species (see Invasive management plan) with clear annual monitoring and treatment, and special consideration given to stabilization of the bank by re-establishment of native species.



Issued:	For review
1 11-10-21	For review
2 11-15-21	For review
3 11-22-21	For review
4	
5	
6	
7	

LANDSCAPE PLAN

38 RAILROAD ST

Haverhill, MA

Scale: 1"=20'-0"

KDTurner Design
landscape architecture

27 High St.
Newburyport, MA 01950
ph) 781.632.6004



SAFETY DATA SHEET **Blue Foaming Agent**

May be used to comply with OSHA's Hazard Communication Standard, 29CFR 1910.1200. Standard must be consulted for specific regulations.

Quick Identifier
Common Name (Used on Label)

SECTION I - IDENTIFICATION

Blue Foaming Agent

Manufacturer's Name - **Green Shoots**

Address - **262 Griggs St South
St. Paul, MN 55105
651-245-4682**

Emergency Telephone # - **651-245-4682**

Secondary Telephone No.:

Revision Date: **10/07/2016**

SECTION II - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Signal Word: WARNING

GHS Classification:

Eye Corrosion/Irritation - Category 2A Causes serious eye irritation

Wash hands thoroughly after handling. Wear eye protection/face protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists Get medical attention.

HMIS HAZARD RATINGS

HEALTH	2	
FLAMMABILITY	1	
REACTIVITY	0	
HEALTH HAZARD: May cause serious eye irritation.		

EYES: May cause serious eye irritation.

SKIN: Not expected to be irritating.

INHALATION: No information available.

INGESTION: Not considered toxic.

(See section for Toxicological Information)

SECTION III - COMPOSITION / INFORMATION ON INGREDIENTS

PRODUCT NAME: Blue Foaming Agent

SYNONYMS: Alkyl Polyglycoside C8-C10

CHEMICAL NAME: Alkyl Polyglycoside C8-C10 CAS#: 68515-73-1 EC#:

Ingredients	CAS#	CAS# % by Weight
Alkyl Polyglycoside C8-C10	68515-73-1	51.1
Water	7732-18-5	35.6
Blue Dye	3844-45-9	13.3

See sections on Exposure Guidelines and Regulatory Classifications.

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Quick Identifier
Common Name (Used on Label)

Other Information

EYES: Rinse thoroughly with water for at least 15 minutes. Do not rub eyes as mechanical abrasion could result. Consult a physician.

SKIN: Wash off thoroughly with soap and water. Consult a physician.

INHALATION: Move person to fresh air. If not breathing, provide artificial respiration. Consult a physician.

INGESTION: Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

SECTION V - FIRE-FIGHTING MEASURES

NFPA Rating

FLAMMABLE PROPERTIES:

HEALTH 2
FLAMMABILITY 1
REACTIVITY 0

FLASH POINT: CLOSED CUP > 200°F (Pensky-Martens)

AUTO IGNITION TEMPERATURE: No data available.

FLAMMABLE LIMITS IN AIR % BY VOLUME: LOWER No data available. UPPER No data available.

FIRE AND EXPLOSION HAZARD: Emits carbon monoxide and carbon dioxide.

EXTINGUISHING MEDIA AND INSTRUCTIONS:

Water spray, alcohol resistant foam, dry chemical or carbon dioxide. Wear self-contained breathing apparatus.

SPECIAL REMARKS: In case of fire, keep containers cool with water spray. If a spill or leak has not ignited, use water spray to disperse the vapors. Water spray may be used to flush spills away from fire.

SECTION VI - ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK:

SMALL SPILLS: Add dry material to absorb spill, pick up spilled material and containerize for recovery or disposal. Flush area with water to remove residues.

LARGE SPILLS: Use a dike to contain.

SPILL PRECAUTIONS: Use personal protective equipment. Ensure adequate ventilation.

SECTION VII - HANDLING AND STORAGE

USUAL SHIPPING CONTAINERS: Polyethylene bottles

STORAGE/TRANSPORT TEMPERATURE: Ambient.

STORAGE/TRANSPORT PRESSURE: Ambient.

PRECAUTIONS: Keep containers tightly closed.

BULK STORAGE: N/A

SECTION VIII - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Ensure good area ventilation.

PERSONAL PROTECTIVE EQUIPMENT:

EYES: Wear safety glasses or goggles.

SAFETY DATA SHEET **Blue Foaming Agent**

May be used to comply with OSHA's Hazard Communication Standard,
29CFR 1910.1200. Standard must be consulted for specific regulations.

Quick Identifier
Common Name (Used on Label)

JAPANESE (MITI) LISTING:

KOREAN INVENTORY LISTING:

AUSTRALIAN (AICS) LISTING:

NEW ZEALAND LISTING:

PHILIPPINES (PICCS) LISTING:

CALIFORNIA PROP. 65 LISTING:

SECTION XVI - OTHER INFORMATION

EXCEPT AS SPECIFICALLY SET FORTH IN THE TERMS AND CONDITIONS AVAILABLE AS SET FORTH BELOW,
GREEN SHOOTS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION,
WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE CHEMICALS IT SELLS.

The information contained herein is to our best knowledge true and accurate. Recommendations and suggestions are made without
guarantee of favorable results since conditions of use are beyond our control. These data shall not be construed as a recommendation to
use any product in conflict with existing patents covering any material or use.